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ABSTRACT

This report presents national estimates of employment of scientists, engineers, and technicians (SETs) in manufacturing industries in 1983. The estimates are provided as data in five charts and three detailed statistical tables. Data in charts include: SETs by sector of employment; employment growth in high-technology and other manufacturing industries (1980-83); scientific and technical personnel by selected manufacturing industry; employment of SETs in manufacturing industries by occupational groups; and SETs in manufacturing industries. Tabular data include: SETs in manufacturing industries by major occupational group and detailed industry of employment; SETs in manufacturing industries by detailed occupation and broad industry of employment; and SETs in each manufacturing industry as a percent of total employment in the industry, and the relative error. Analysis of these data, which come from the Occupational Employment Statistics survey and are in Standard Industrial Classification codes 20 through 39, provides information into the dynamics of the labor market as demand for SETs responds to variations in growth among industries, and to the impact of technology and other factors, upon industry. One finding is that three industries (electrical and nonelectrical machinery, and transportation equipment) employed the bulk of engineers and technicians, while scientists were concentrated in the chemicals industry. (JN)

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# section a

# general

This report presents national estimates of employment of scientists, engineers, and technicians in manufacturing industries in 1983. The data come from the Occupational Employment Statistics (OES) survey, a Federal/State program producing national, State, and local data on occupational employment by industry for nonfarm wage and salary workers. The Bureau of Labor Statistics (BLS) has primary responsibility for developing survey procedures and providing technical guidance. State employment security agencies implement the survey at State and local levels and prepare current and projected employment statistics for these labor markets. BLS conducts supplemental surveys in nonparticipating States and combines the data from all States to provide national estimates.

The National Science Foundation (NSF) has enhanced the BLS effort since 1977 by financing full coverage of scientific and technical occupations and data collection in nonparticipating States. Thus, the data yield reliable national estimates of private industry personnel. Analysis of this information provides insight into the dynamics of the labor market as demand for scientists, engineers, and technicians responds to variations in growth among industries, and to the impact of technology, and other factors, upon industry.

A recently published *Science Resources Studies Highlights*, "Scientific and Technical Employment in Manufacturing Industries Reaches 1.5 Million in 1985" (available on request) presents an analysis of trends in scientific and technical employment in manufacturing over the 1977-83 period. Requests for previously published data and additional information should be addressed to:

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# section b

# technical notes

## scope of the survey

The OES survey[1] is conducted in 3-year cycles: manufacturing industries are surveyed in the first year; mining, construction, financial, and various service industries in the nonmanufacturing sector are surveyed in the second; and trade, communications, transportation, and public utilities are surveyed in the third year. Data in this report are from the 1983 survey of Manufacturing Industries, and are in Standard Industrial Classification (SIC) codes 20 through 39. The reference dates of the survey were the weeks that included April 12, May 12, or June 12, depending on the SIC of the sampled unit. The survey covered all 50 States and the District of Columbia.

## method of collection

Survey forms for the OES were mailed to personnel offices of most sample establishments. Nonrespondents received two additional mailings at 6-week intervals with telephone followups. In some cases, field personnel made personal visits to those nonrespondent companies deemed critical to the survey because of their size.

Each industry being surveyed received a separate questionnaire in which detail was limited to occupations with significant numbers of employees. Abbreviated survey forms in which related occupations were combined were sent to small establishments to diminish the reporting burden and to encourage participation. On the questionnaires, the specific occupations were grouped under broad headings, each with a residual category for occupations not explicitly listed on the survey form.

## limitations on analysis

Data collection methodology in the OES survey introduces several problems that should be taken into account when interpreting these data. First, the OES survey tends to understate requirements in specific fields. Second, this same survey characteristic can be expected to overstate cross-industry differences in staffing patterns: the finer the level, the more serious the problem. This occurs because an occupation will be listed explicitly on an industry's questionnaire only if it is judged to be a major job class; otherwise, it is put into a residual category.

## reconciliation with 1980 OES data

The occupational categories in this report differ somewhat from the categories published in the OES for manufacturing in 1980 in *Scientists, Engineers, and Technicians in Manufacturing and Nonmanufacturing Industries: 1980-81* (NSF 83-324). The 1983 total includes 6,000 operations researchers and systems analysts (except computer), a category not in the 1980 data. Also, there were overcounts of 4,000 physical scientists and 60,000 science technicians in 1980. Social scientists were surveyed in 1980, but not in 1983.

The largest factor affecting 1980 and 1983 comparisons by field was the assignment of "all other" natural and mathematical scientists (7,000 personnel in 1980) to their specific occupational groups in 1983. Engineer field totals were affected by the introduction of the category "sales engineer" in 1983. In 1980 sales engineers were found within their respective specialties.

[1] A description of the OES survey can be found in Department of Commerce, *The National OES-Based Industry-Occupational Employment Matrix, 1982 and 1995* (Arlington, Va.: National Technical Information Service).

## occupational and industry classification

The OES survey collects data for approximately 60 scientific, engineering, and technical occupations and uses three classification systems—the Dictionary of Occupational Titles (DOT) and the 1980 Census of Population, and the Standard Occupational Classification System (SOC). The DOT system is used to develop occupational categories and definitions because its classification scheme is detailed. Summary categories are comparable to the broader categories used in the Census and SOC.

Industries surveyed were classified according to the 1972 Standard Industrial Classification (SIC) codes. Reporting establishments were categorized on the basis of major product or activity for the previous calendar year.

## concepts

An establishment, such as a factory, is the primary sampling unit in the survey. In general, it represents a single physical location and engages in one type of economic activity. When several distinct activities are performed in one location, each is construed as being performed in an individual establishment, assuming that separate payroll records and other criteria are met.

This report covers several types of personnel: Full-time and part-time workers; workers on paid vacation or on other types of leave; workers on unpaid short-term absence; salaried officers, executives, and staff of unincorporated firms; employees temporarily assigned to other units; and employees for whom the unit is a permanent duty station. Excluded from coverage are proprietors (owners and partners of unincorporated firms), unpaid family workers, and workers on extended leave.

Occupation means the work employees do, rather than the field for which they are trained. To categorize one as a scientist or engineer requires work at a level of knowledge equivalent to that acquired by completion of a 4-year college course with a major in that field, regardless of whether a college degree was ever obtained. Employees who perform multiple functions are reported only in the job believed to require the highest level. Supervisors who spend at least part of their time doing work similar to that of individuals under their supervision are classified in the occupation most closely related to their work duties. Higher level managers and administrators of science and engineering (S/E) activities are excluded from the OES counts of scientists and engineers. Such persons, however, are included in some other published NSF estimates of scientific and technical personnel.

## sampling procedures

The OES survey is a probability sample with a sampling frame based on lists of establishments covered by State Unemployment Insurance (U.I. systems). Because each cooperating State selected its own sample, the reference date of the sampling frame varies by date when the last sample frame was updated and the survey was conducted. The reference date for sampling in the States surveyed by BLS for the 1983 survey was the second quarter of 1983.

The survey universe is stratified by industry and size of establishment unit since these characteristics are believed to be primary determinants of occupational staffing patterns. Nine size-classes were represented, based on numbers of people employed: 1 to 3, 4 to 9, 10 to 19, 20 to 49, 50 to 99, 100 to 249, 250 to 499, 500 to 999, and 1,000 and over.

Because U.I. reporting units with 1 to 3 employees were not sampled in every State, units with 4 to 9 employees received larger weights to represent employment in the 1 to 3 size-class. Reporting units with 1,250 or more employees were included in the sample with certainty. Samples for noncertainty size-classes were developed to produce State estimates with target relative errors of 10 percent, 15 percent, and 20 percent at one standard deviation. This was done for SIC groups based on averages of occupational rates and coefficients of variation (CV's) from the previous survey of those groups for a set of typical occupations. This SIC sample size was allocated to the classes in proportion to their employment. The sample was selected systematically with equal probability within each State/SIC/area/size-class cell.

The sample for the States surveyed by BLS was developed by first determining the sample size required for national estimates in each 2-digit SIC with a target relative error of 10 percent. This was done by averaging CV's and occupational rates for a set of occupations from the previous survey of those SIC groups. This national sample size was then allocated to the three nonparticipating States' size-class cells proportionally by employment. Such allocation produced a total initial sample size of 158,023 U.S. reporting units.

## response

Of the reporting units selected, 149,213 were eligible; i.e., those out of business and out of scope were excluded. Usable responses were obtained from 110,305 units. The response rates were 73.9 percent based on units and 68.0 percent based on weighted employment.

## estimation

Weights were determined for the sample units for which usable responses were received. Each weight was composed of two factors. The first was the inverse of the probability of selection. The second was the nonresponse adjustment factor. For questionnaires that were not returned or were otherwise not usable, a response adjustment was made to impute for the nonrespondents. For each of the 3-digit SIC/State/size-class sampling cells, the nonresponse factor was calculated that was equal to:

$$\frac{\text{Weighted sample employment of all eligible units in sample}}{\text{Weighted sample employment of all responding eligible units.}}$$

The sample employments were taken from the sampling frame. If the nonresponse factor in a cell was greater than

a predetermined maximum factor—which increased as the number of respondents in a cell increased—the cell was collapsed with other homogeneous cells within an SIC until the factor for the combined cell was not greater than the appropriate maximum factor. If the collapsing procedure terminated (i.e., no more cells were available for collapse) before satisfying the constraint, then the appropriate maximum factor was used. For size-classes 1 through 6, homogeneous cells were determined to be other size cells within the SIC and State. For size-classes 7 through 9, homogeneous cells were determined to be other *State* cells within the SIC and size-class. The weight for each unit was the product of the nonresponse adjustment factor and probability of selection.

A combined ratio estimate of occupational employment was used to develop national estimates. The auxiliary variable used was total employment. The estimating formula was:

$$\hat{P} = \sum_i \left( \frac{\sum_j \sum_k w_{ijk} P_{ijk}}{\sum_j \sum_k w_{ijk} e_{ijk}} \right) M_i$$

where $\hat{P}$ = 2-digit industry occupational employment estimate,
$i$ = 3-digit industry within a 2-digit industry,
$j$ = size class,
$k$ = establishment,
$w_{ijk}$ = weight after nonresponse adjustment in $i$th industry, $j$th size-class and $k$th establishment,
$P_{ijk}$ = occupational employment in $i$th industry, $j$th size-class and $k$th establishment,
$e_{ijk}$ = total employment in $i$th industry, $j$th size-class and $k$th establishment, and,
$M_i$ = population total employment in $i$th industry.

The population value of total employment ($M_i$) was obtained from the BLS Survey of Employment, Hours, and Earnings.

The following is the standard formula for the sampling variance for a combined ratio estimate:[2]

$$V(\hat{P}) = \sum_i \sum_j \left( \frac{N_{ij}^2 (1 - f_{ij})}{n_{ij}} \right) (S_{pij}^2 + R_i^2 S_{eij}^2 - 2R_i K_{ij} S_{pij} S_{eij})$$

where $V(\hat{P})$ = variance of $\hat{P}$
$i$ = 3-digit industry within 2-digit industry,
$j$ = size-class,
$N_{ij}$ = total number of units in the $i$th industry and $j$th size-class,
$f_{ij}$ = sampling fraction in the $i$th industry and $j$th size-class,
$n_{ij}$ = number of sample units in the $i$th industry and $j$th size-class,
$S_{pij}$ = standard deviation of $p$ within $i$th industry and $j$th size-class,
$S_{eij}$ = standard deviation of $e$ within $i$th industry and $j$th size-class, and
$K_{ij}$ = correlation coefficient between $p$ and $e$ within $i$th industry and $j$th size-class.

The variance for the occupational estimates were estimated using the following formula:

$$\text{Var}(\hat{P}) = \sum_i \sum_j T_{ij} V_{ij}^2$$

where,

$$T_{ij} = \left( \frac{M_{ij} - e_{ij}}{M_{ij}} \right) \left( \frac{(\sum_k w_{ijk}^2)(\sum_k w_{ijk})}{(\sum_k w_{ijk})^2 - (\sum_k w_{ijk}^2)} \right) \cdot \left( \frac{M_i}{\sum_j \sum_k w_{ijk} e_{ijk}} \right)^2$$

$$V_{ij}^2 = \sum_k w_{ijk} [(P_{ijk} - R_i e_{ijk}) - (p_{ij} - R_i e_{ij})]^2$$

where $M_{ij}$ = benchmark total employment in the $i$th industry and $j$th size-class
$R_i = (\sum_j \sum_k w_{ijk} P_{ijk}) / (\sum_j \sum_k w_{ijk} e_{ijk})$, and
$e_{ij} = \sum_k e_{ijk}$

and all other terms are as defined previously. This formula is almost a computational form of the standard formula, $V(P)$, already given. One simplifying assumption has been made:

$$W_{ijk} = C_{ij} \text{ for all } k \text{ in a given } ij \text{ cell}$$

That is, the weights are equal to a constant C within a given 3-digit industry/size-class cell. The total effect of this assumption on the variance estimates was not measured.

## reliability of estimates

The estimates developed from the sample may differ from the results of a census of all establishments in the sample frame. There are two types of errors, sampling and nonsampling, possible in an estimate based on sample data. Sampling error occurs because observations are made only on a sample, not on the entire population. Nonsampling errors can be attributed to many sources; e.g., inability to obtain information about all cases in a sample, differences in the respondent's interpretation of questions, inability of respondents to provide correct information, errors made in recording, coding, or processing the data, and failure to represent all units in the population.

The particular sample used in this survey is one of a large number of possible samples of the same size that could have been selected using the same sample design. Estimates derived from the different samples would differ from each other. The deviation of a sample estimate from the average of all possible samples is called the sample error. The standard error of a survey estimate is a measure of the variation among the estimates from all possible samples. Thus, it is a measure of the precision with which an estimate from a particular sample approxi-

[2]This formula is derived from the equation for computing the variance of a ratio estimate given by William Cochran in *Sampling Techniques* (New York, N.Y.: John Wiley and Sons, 1977), p. 166.

mates the average results of all possible samples. The relative standard error is defined as the standard error of the estimate divided by the value being estimated. The variance is the standard error squared. (In the OES Survey, the term "relative error is used synonymously with the term "relative standard error.")

The sample estimate and an estimate of its standard error enable one to construct interval estimates with prescribed confidence that the interval includes the average result of all possible samples that could be obtained from the sample design for this survey.

To illustrate, if all possible samples were selected, and each of these were surveyed under essentially the same conditions, and an estimate and its estimated standard error were calculated from each sample, then:

(1) Approximately 68 percent of the intervals from one standard error below to one standard error above the derived estimate would include the average value of all possible samples. This interval is called a 68-percent confidence interval.

(2) Approximately 90 percent of the intervals from 1.6 standard errors below to 1.6 standard errors above the derived estimate would include the average of all possible samples. This interval is called a 90-percent confidence interval.

(3) Approximately 95 percent of the intervals from two standard errors below to two standard errors above the derived estimate would include the average of all possible samples. This interval is called the 95-percent confidence interval.

(4) Almost all intervals from three standard erors below to three standard errors above the derived estimate would include the average of all possible samples.

An inference that the complete coverage would be within the indicated ranges would be correct in approximately the relative frequencies shown.

For example, suppose an estimated employment total is shown as 5,000 with an associated relative error (relative standard error) of 2 percent. Based on these data, the two-thirds confidence interval is from 4,900 to 5,100 employment. To conclude that the average estimate of total employment lies within a range computed in this way would be correct for roughly two-thirds of all possible samples.

The relative errors indicate primarily the magnitude of the sampling error but do not measure biases in the data resulting from nonsampling error. Efforts were made to reduce the biases arising from errors in recording, coding, and processing the data. The adjustments made for nonrespondents assumed that their characteristics were the same as those of the respondents at a given level. To the extent that this is not true, bias is introduced into the data. The magnitude of these biases is unknown.

Particular care should be exercised in the interpretation of estimates based on a small number of cases, or on small differences between estimates, because of relatively large sampling errors and the unknown magnitude of the biases.

# section c

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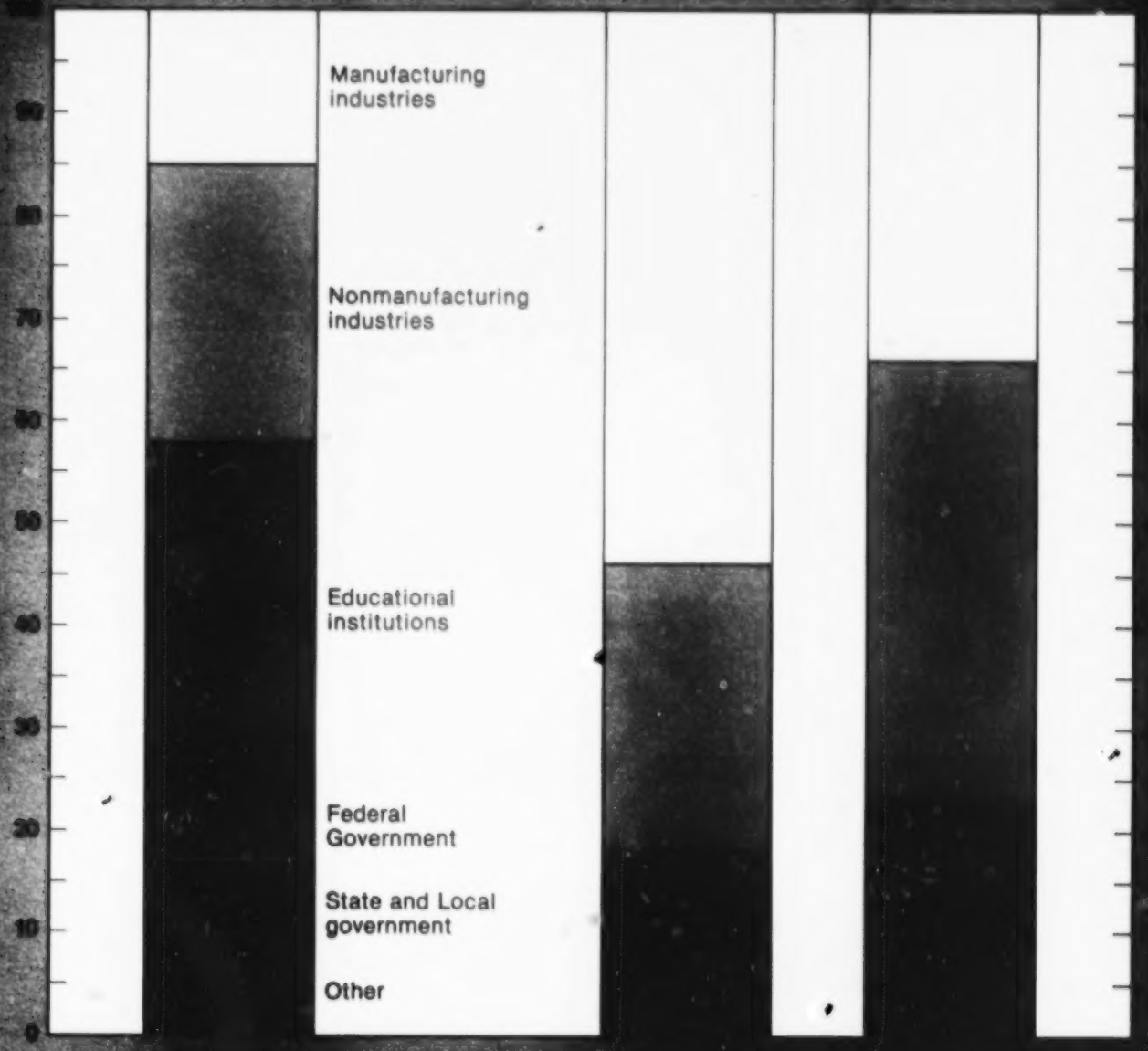
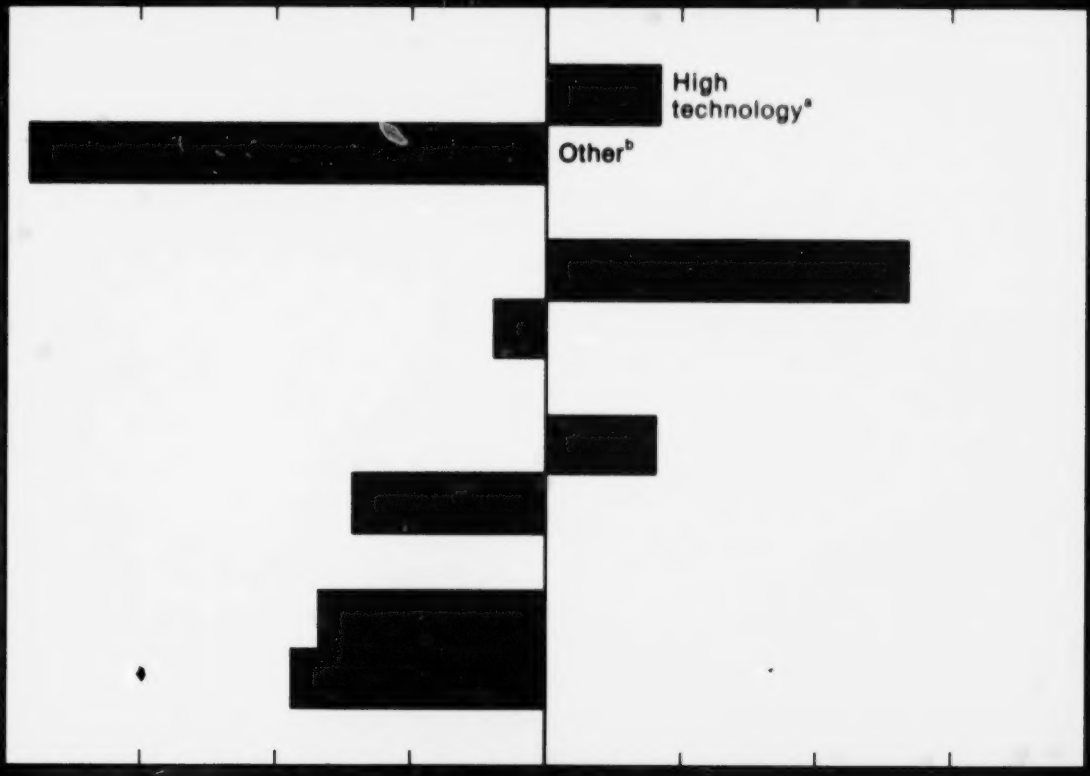
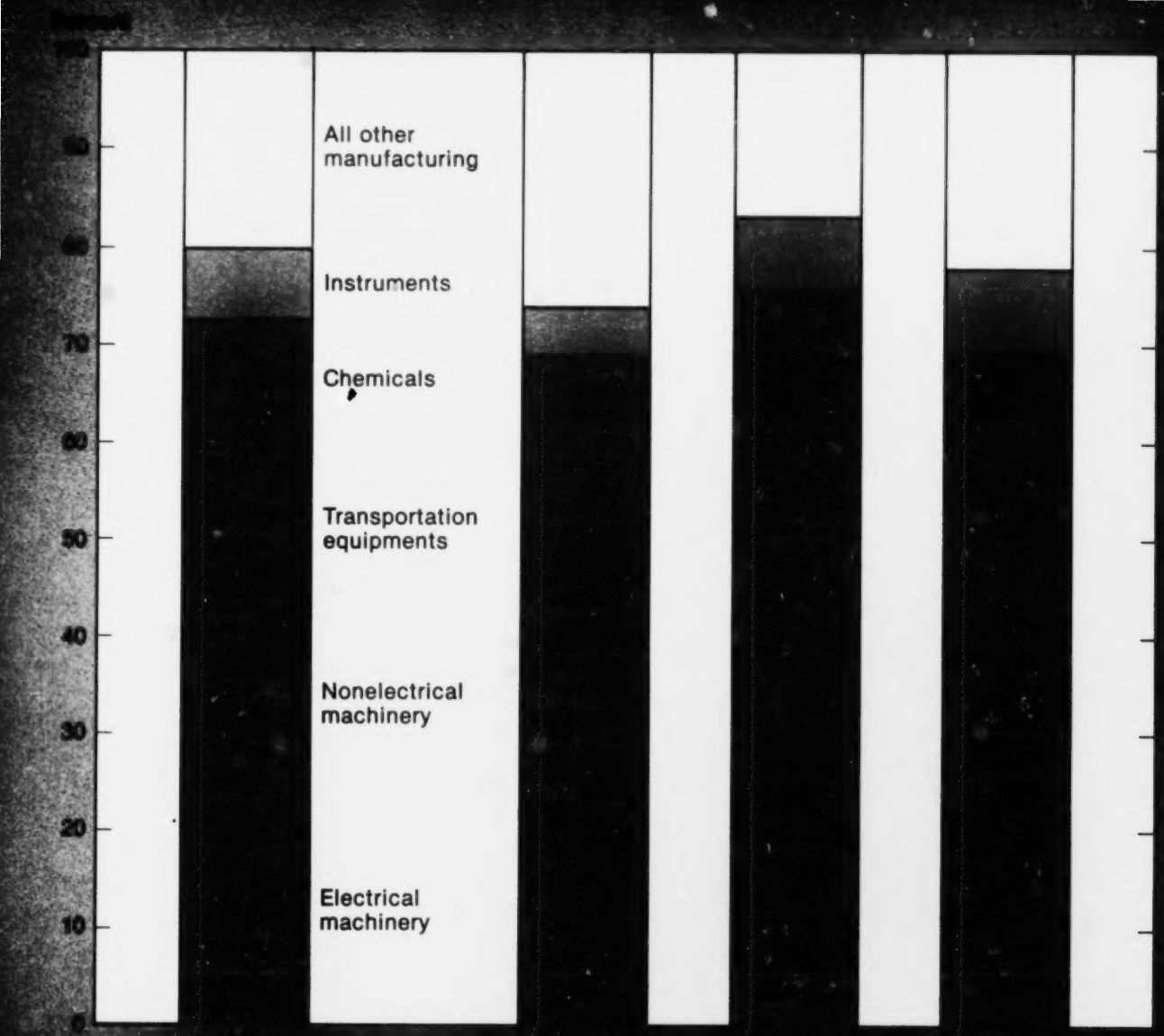


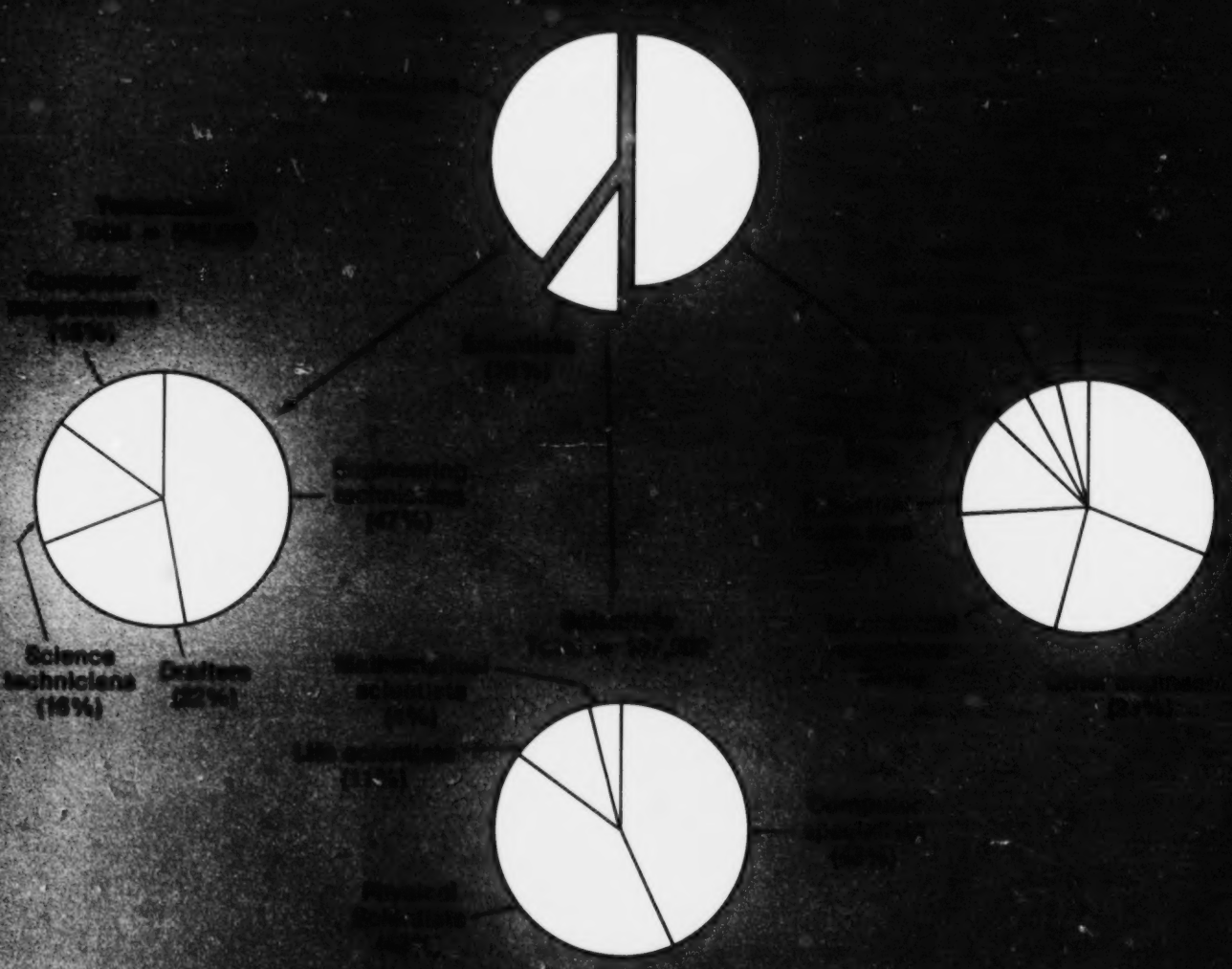

• Manufacturing industries are a major employer of scientific and technical personnel. In 1983, they provided jobs for about 15 percent of the Nation's scientists, 50 percent of the engineers, and 40 percent of its technicians.



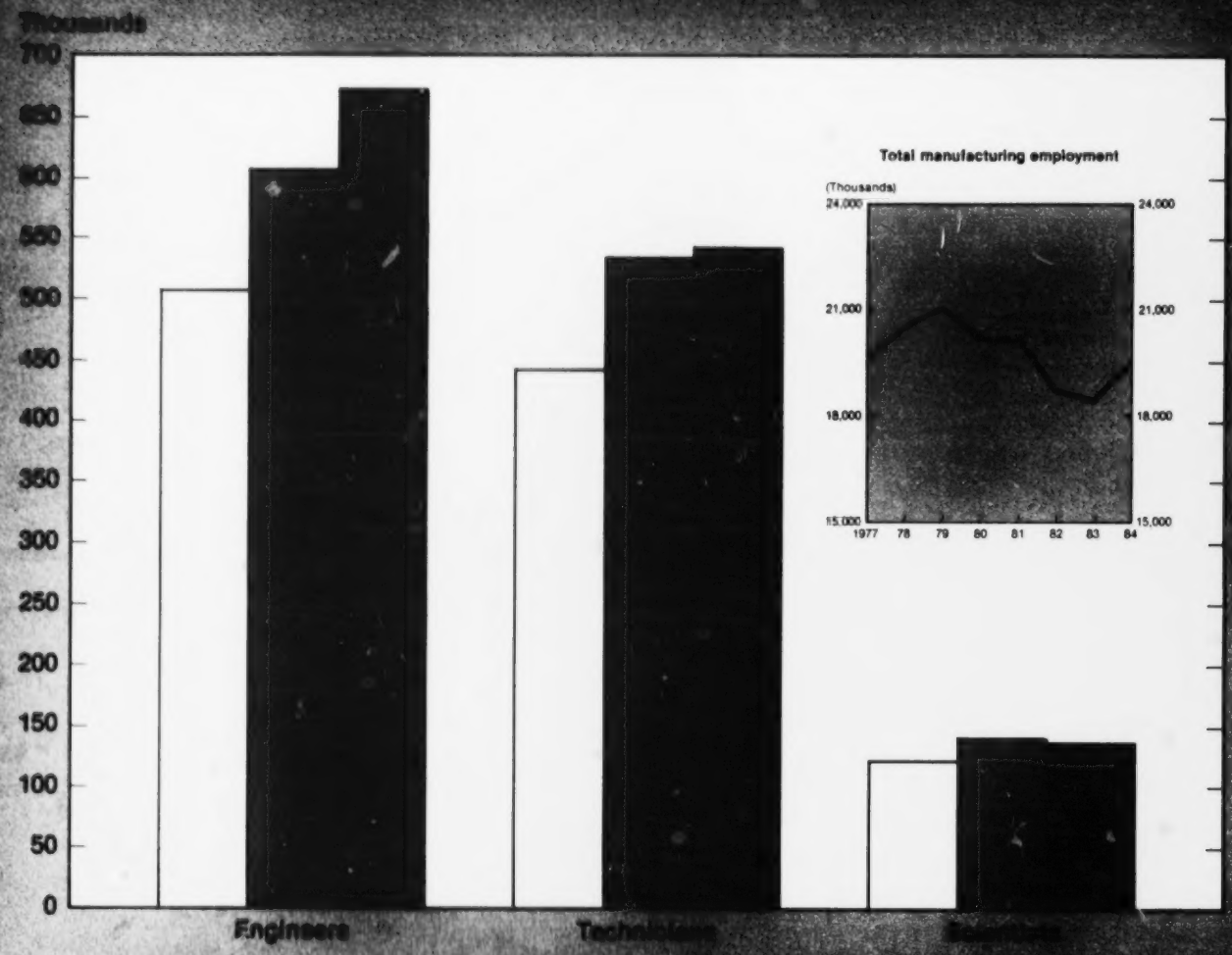

• The six high-technology industries (electrical and nonelectrical machinery, transportation equipment, chemicals, refined petroleum products, and instruments) employed more than 80 percent of scientific and technical personnel in manufacturing firms, but only 42 percent of the total number of workers. Nine of every 10 new scientific and technical jobs in manufacturing firms during 1980-83 were generated in five of these industries. Only the nonelectrical machinery industry reported a loss in such jobs (4 percent). That loss was confined to technician employment which offset the growth of scientists and engineers.




• Three industries — electrical and nonelectrical machinery, and transportation equipment — employed the bulk of engineers and technicians. Scientists were concentrated in the chemicals industry. Together, these four industries employed about three-fourths of the scientific and technical personnel in the manufacturing sector.




• Nearly two-thirds of the engineers in manufacturing industries were concentrated in three occupations: electrical/electronics engineering (31 percent), mechanical engineering (20 percent), and industrial engineering (13 percent). The main occupational groups among the scientists in manufacturing were computer specialists (43 percent), and physical scientists (42 percent). Engineering technicians predominated in that occupational group (47 percent).




SOURCES: National Science Foundation and Bureau of Labor Statistics

- The number of scientists, engineers, and technicians employed in manufacturing industries during 1980-83 grew 6 percent, reaching over 1.3 million. This growth was in sharp contrast to the 9-percent decrease in overall manufacturing employment, which fell by 1.9 million.

- The changes in employment were markedly different from those that occurred during 1977-80 when the number of scientific and technical personnel decreased 19 percent and the total number of manufacturing jobs increased 3 percent. Economic conditions, especially the 1981-82 recession, were primarily responsible for the differences between the two periods.

# section d

# detailed statistical tables


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TABLE D-1. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN MANUFACTURING INDUSTRIES BY MAJOR OCCUPATIONAL GROUP AND DETAILED INDUSTRY OF EMPLOYMENT: 1983
[Numbers in thousands]

| Industry | Scientists, engineers, and technicians | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Total | Percent | Scientists | Percent | Engineers | Percent | Technicians | Percent |
| Total manufacturing | 1,353.7 | 100.0 | 142.9 | 100.0 | 669.2 | 100.0 | 541.7 | 100.0 |
| DURABLE GOODS | 1,063.5 | 78.6 | 66.6 | 46.6 | 576.6 | 86.2 | 420.2 | 77.6 |
| Lumber and wood products | 5.9 | .4 | 1.3 | .9 | 1.6 | .2 | 3.1 | .6 |
| Logging camps and contractors | .2 | (1) | .1 | .1 | (1) | (1) | .1 | (1) |
| Sawmills and planing mills | 2.1 | .2 | .8 | .6 | .5 | .1 | .8 | .1 |
| Millwork, plywood, structural wood | 1.8 | .1 | .3 | .2 | .5 | .1 | 1.1 | .2 |
| Wood containers | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) |
| Wood buildings and mobile homes | 1.0 | .1 | (1) | (1) | .2 | (1) | .8 | .2 |
| Miscellaneous wood products | .7 | (1) | .1 | .1 | .3 | (1) | .3 | .1 |
| Furniture and fixtures | 5.7 | .4 | .4 | .3 | 2.1 | .3 | 3.1 | .6 |
| Household furniture | 2.0 | .1 | .2 | .1 | .9 | .1 | .9 | .2 |
| Office furniture | 1.0 | .1 | .1 | .1 | .5 | .1 | .5 | .1 |
| Public building and related furniture | .5 | (1) | (1) | (1) | .2 | (1) | .3 | .1 |
| Partitions and office and store fixtures | 1.5 | .1 | .1 | .1 | .4 | .1 | 1.0 | .2 |
| Miscellaneous furniture and fixtures | .6 | (1) | (1) | (1) | .2 | (1) | .4 | .1 |
| Stone, clay, and glass products | 17.0 | 1.3 | 1.9 | 1.3 | 7.4 | 1.1 | 7.8 | 1.4 |
| Flat glass | .7 | (1) | (1) | (1) | .4 | .1 | .3 | (1) |
| Glass and glassware, pressed or blown | 3.1 | .2 | .2 | .1 | 1.5 | .2 | 1.4 | .3 |
| Products of purchased glass | 1.4 | .1 | .3 | .2 | .6 | .1 | .5 | .1 |
| Cement, hydraulic | 1.6 | .1 | .4 | .3 | .4 | .1 | .8 | .1 |
| Structural clay products | .4 | (1) | (1) | (1) | .1 | (1) | .2 | (1) |
| Pottery and related products | 1.0 | .1 | (1) | (1) | .5 | .1 | .4 | .1 |
| Concrete, gypsum, and plaster products | 2.7 | .2 | .2 | .2 | .8 | .1 | 1.6 | .3 |
| Cut stone and stone products | .3 | (1) | - | - | (1) | (1) | .3 | (1) |
| Miscellaneous nonmetallic mineral products | 6.0 | .4 | .7 | .5 | 3.1 | .5 | 2.2 | .4 |
| Primary metals | 37.3 | 2.8 | 4.1 | 2.9 | 18.5 | 2.8 | 14.7 | 2.7 |
| Blast furnaces and basic steel products | 14.8 | 1.1 | 1.9 | 1.3 | 7.0 | 1.0 | 6.0 | 1.1 |
| Iron and steel foundries | 5.0 | .4 | .3 | .2 | 2.8 | .4 | 2.0 | .4 |
| Primary nonferrous metals | 3.4 | .3 | .5 | .3 | 1.3 | .2 | 1.7 | .3 |
| Secondary nonferrous metals | .9 | .1 | .2 | .1 | .4 | .1 | .3 | .1 |
| Nonferrous rolling and drawing | 10.6 | .8 | 1.1 | .8 | 5.6 | .8 | 4.0 | .7 |
| Nonferrous foundries (castings) | 1.6 | .1 | .1 | .1 | .9 | .1 | .6 | .1 |
| Miscellaneous primary metal products | .8 | .1 | (1) | (1) | .6 | .1 | .2 | (1) |
| Fabricated metal products | 65.0 | 4.8 | 3.1 | 2.2 | 32.9 | 4.9 | 28.9 | 5.3 |
| Metal cans and shipping containers | 1.4 | .1 | .1 | (1) | .7 | .1 | .7 | .1 |
| Cutlery, handtools, and hardware | 5.3 | .4 | .6 | .4 | 2.8 | .4 | 1.9 | .3 |
| Heating equipment and plumbing fixtures | 2.9 | .2 | .1 | .1 | 1.6 | .2 | 1.2 | .2 |
| Fabricated structural metal products | 30.5 | 2.3 | 1.0 | .7 | 14.1 | 2.1 | 15.4 | 2.8 |

See footnotes at end of table.

TABLE D-1. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN MANUFACTURING INDUSTRIES BY MAJOR OCCUPATIONAL GROUP AND DETAILED INDUSTRY OF EMPLOYMENT: 1983--con.
[Numbers in thousands]

| Industry | Scientists, engineers, and technicians | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Total | Percent | Scientists | Percent | Engineers | Percent | Technicians | Percent |
| Screw machine products, and bolts, nuts and washers | 2.2 | 0.2 | 0.1 | (1) | 1.3 | 0.2 | 0.9 | 0.2 |
| Metal forgings and stampings | 5.4 | .4 | .3 | 0.2 | 3.0 | .4 | 2.1 | .4 |
| Coating, engraving, and allied services | 1.1 | .1 | .2 | .1 | .5 | .1 | .4 | .1 |
| Ordnance and accessories, n.e.c | 4.9 | .4 | .4 | .3 | 2.9 | .4 | 1.7 | .3 |
| Miscellaneous fabricated metal products | 11.2 | .8 | .5 | .4 | 6.0 | .9 | 4.7 | .9 |
| Machinery, except electrical | 258.2 | 19.1 | 16.5 | 11.6 | 130.3 | 19.5 | 111.4 | 20.6 |
| Engines and turbines | 14.2 | 1.0 | 1.6 | 1.1 | 7.0 | 1.0 | 5.6 | 1.0 |
| Farm and garden machinery and equipment | 8.0 | .6 | .6 | .4 | 4.2 | .6 | 3.2 | .6 |
| Construction and related machinery and equipment | 29.2 | 2.2 | 1.4 | 1.0 | 15.9 | 2.4 | 11.9 | 2.2 |
| Metalworking machinery and equipment | 19.2 | 1.4 | .7 | .5 | 10.0 | 1.5 | 8.6 | 1.6 |
| Special industry machinery except metalworking | 18.2 | 1.3 | .7 | .5 | 10.1 | 1.5 | 7.4 | 1.4 |
| General industrial machinery and equipment | 24.3 | 1.8 | 1.1 | .8 | 12.8 | 1.9 | 10.4 | 1.9 |
| Office, computing, and accounting machines | 126.1 | 9.3 | 9.6 | 6.7 | 60.7 | 9.1 | 55.7 | 10.3 |
| Refrigeration and service industry machinery | 11.4 | .8 | .6 | .4 | 5.2 | .8 | 5.6 | 1.0 |
| Miscellaneous machinery, except electrical | 7.6 | .6 | .2 | .1 | 4.4 | .7 | 3.1 | .6 |
| Electrical machinery | 314.9 | 23.3 | 15.1 | 10.6 | 173.2 | 25.9 | 126.6 | 23.4 |
| Electrical transmission and distribution equipment | 9.7 | .7 | .4 | .3 | 4.8 | .7 | 4.5 | .8 |
| Electrical industrial apparatus | 22.7 | 1.7 | .9 | .6 | 12.7 | 1.9 | 9.2 | 1.7 |
| Household appliances | 6.1 | .5 | .4 | .3 | 3.5 | .5 | 2.2 | .4 |
| Electric lighting and wiring equipment | 11.9 | .9 | .7 | .5 | 6.8 | 1.0 | 4.4 | .8 |
| Radio and television receiving equipment | 7.1 | .5 | .3 | .2 | 3.9 | .6 | 3.0 | .6 |
| Communications equipment | 148.9 | 11.0 | 6.4 | 4.5 | 89.9 | 13.4 | 52.6 | 9.7 |
| Electronic components and accessories | 97.8 | 7.2 | 5.2 | 3.7 | 46.1 | 6.9 | 46.4 | 8.6 |
| Miscellaneous electrical equipment and supplies | 10.7 | .8 | .8 | .5 | 5.6 | .8 | 4.3 | .8 |
| Transportation equipment | 249.7 | 18.4 | 16.4 | 11.5 | 158.7 | 23.7 | 74.6 | 13.8 |
| Motor vehicles and equipment | 60.7 | 4.5 | 6.1 | 4.3 | 32.9 | 4.9 | 21.6 | 4.0 |
| Aircraft and parts | 122.8 | 9.1 | 8.0 | 5.6 | 81.1 | 12.1 | 33.7 | 6.2 |
| Ship and boat building and repair | 10.1 | .7 | .4 | .2 | 5.0 | .7 | 4.7 | .9 |
| Railroad equipment | 2.6 | .2 | .2 | .1 | 1.4 | .2 | .9 | .2 |
| Motorbicycles, bicycles, and parts | .4 | (1) | .1 | (1) | .2 | (1) | .1 | (1) |
| Guided missiles and space vehicles and parts | 50.9 | 3.8 | 1.7 | 1.2 | 36.4 | 5.4 | 12.7 | 2.3 |
| Miscellaneous transportation equipment | 2.2 | .2 | (1) | (1) | 1.5 | .2 | .7 | .1 |
| Instruments | 103.1 | 7.6 | 7.0 | 4.9 | 49.8 | 7.4 | 46.4 | 8.6 |
| Engineering and scientific instruments | 16.0 | 1.2 | .8 | .6 | 8.1 | 1.2 | 7.1 | 1.3 |
| Measuring and controlling instruments | 43.2 | 3.2 | 2.0 | 1.4 | 22.8 | 3.4 | 18.5 | 3.4 |
| Optical instruments and lenses | 7.5 | .6 | .3 | .2 | 3.3 | .5 | 3.9 | .7 |
| Medical and dental instruments and supplies | 13.6 | 1.0 | 1.4 | 1.0 | 5.1 | .8 | 7.1 | 1.3 |
| Opthalmic goods | 1.3 | .1 | .1 | .1 | .5 | .1 | .7 | .1 |

See footnotes at end of table.

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TABLE D-1. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN MANUFACTURING INDUSTRIES BY MAJOR OCCUPATIONAL GROUP AND DETAILED INDUSTRY OF EMPLOYMENT: 1983--con.
[Numbers in thousands]

| Industry | Scientists, engineers, and technicians | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Total | Percent | Scientists | Percent | Engineers | Percent | Technicians | Percent |
| Photographic equipment and supplies | 21.1 | 1.6 | 2.3 | 1.6 | 9.8 | 1.5 | 9.1 | 1.7 |
| Watches, clocks, and parts | .4 | (1) | (1) | (1) | .2 | (1) | .2 | (1) |
| Miscellaneous manufacturing | 6.7 | .5 | .8 | .6 | 2.2 | .3 | 3.7 | .7 |
| Jewelry, silverware, and plated ware | .6 | (1) | .1 | .1 | .2 | (1) | .3 | .1 |
| Musical instruments | .5 | (1) | (1) | (1) | .2 | (1) | .3 | (1) |
| Toys and sporting goods | 2.3 | .2 | .3 | .2 | .9 | .1 | 1.1 | .2 |
| Pens, pencils, and office and art supplies | .6 | (1) | .1 | .1 | .2 | (1) | .3 | .1 |
| Costume jewelry and notions | .5 | (1) | .1 | (1) | .2 | (1) | .2 | (1) |
| Miscellaneous manufactures | 2.3 | .2 | .2 | .1 | .6 | .1 | 1.5 | .3 |
| NONDURABLE GOODS | 290.2 | 21.4 | 76.2 | 53.4 | 92.6 | 13.8 | 121.4 | 22.4 |
| Food and food products | 31.1 | 2.3 | 8.3 | 5.8 | 7.7 | 1.2 | 15.1 | 2.8 |
| Meat products | 3.2 | .2 | .7 | .5 | 1.0 | .1 | 1.5 | .3 |
| Dairy products | 3.9 | .3 | 1.1 | .8 | .8 | .1 | 2.0 | .4 |
| Preserved fruits and vegetables | 5.2 | .4 | 1.2 | .8 | 1.0 | .1 | 3.0 | .6 |
| Grain mill products | 4.3 | .3 | 1.5 | 1.0 | .9 | .1 | 1.9 | .4 |
| Bakery products | 1.4 | .1 | .2 | .1 | .7 | .1 | .5 | .1 |
| Sugar and confectionery products | 3.3 | .2 | .8 | .6 | .9 | .1 | 1.7 | .3 |
| Fats and oils | 1.3 | .1 | .4 | .3 | .4 | .1 | .5 | .1 |
| Beverages | 5.3 | .4 | 1.4 | 1.0 | 1.3 | .2 | 2.5 | .5 |
| Miscellaneous food and kindred products | 3.2 | .2 | 1.0 | .7 | .8 | .1 | 1.4 | .3 |
| Tobacco products | 1.9 | .1 | .2 | .2 | .8 | .1 | .9 | .2 |
| Cigarettes | 1.8 | .1 | .2 | .2 | .7 | .1 | .9 | .2 |
| Cigars | (1) | (1) | – | – | (1) | (1) | – | – |
| Tobacco (chewing and smoking) | (1) | (1) | (1) | (1) | – | – | – | – |
| Tobacco stemming and redrying | .1 | (1) | (1) | (1) | (1) | (1) | (1) | (1) |
| Textiles | 11.2 | .8 | 1.6 | 1.1 | 3.7 | .6 | 5.8 | 1.1 |
| Weaving mills, cotton | 2.2 | .2 | .4 | .3 | .6 | .1 | 1.2 | .2 |
| Weaving mills, manmade fibers | 1.5 | .1 | .2 | .2 | .5 | .1 | .7 | .1 |
| Weaving and finishing mills, wool | .3 | (1) | (1) | (1) | .1 | (1) | .1 | (1) |
| Narrow fabric mills | .2 | (1) | (1) | (1) | .1 | (1) | .1 | (1) |
| Knitting mills | 1.4 | .1 | .2 | .2 | .5 | .1 | .6 | .1 |
| Textile finishing, except wool and knit goods | 1.7 | .1 | .3 | .2 | .4 | .1 | 1.0 | .2 |
| Floor covering mills | 1.0 | .1 | .2 | .1 | .4 | .1 | .4 | .1 |
| Yarn and thread mills | 1.2 | .1 | .1 | .1 | .5 | .1 | .6 | .1 |
| Miscellaneous textile goods | 1.7 | .1 | .2 | .2 | .5 | .1 | .9 | .2 |
| Apparel | 4.6 | .3 | .7 | .5 | 2.1 | .3 | 1.9 | .3 |
| Men's and boys' suits and coats | .2 | (1) | (1) | (1) | .1 | (1) | .1 | (1) |
| Men's and boys' furnishings | 1.6 | .1 | .5 | .3 | .6 | .1 | .5 | .1 |

See footnotes at end of table.

TABLE D-1. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN MANUFACTURING INDUSTRIES BY MAJOR OCCUPATIONAL GROUP AND DETAILED INDUSTRY OF EMPLOYMENT: 1983--con.
[Numbers in thousands]

| Industry | Scientists, engineers, and technicians | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Total | Percent | Scientists | Percent | Engineers | Percent | Technicians | Percent |
| Women's and misses' outerwear | 0.8 | 0.1 | 0.1 | (1) | 0.4 | 0.1 | 0.4 | 0.1 |
| Women's and children's undergarments | .4 | (1) | (1) | (1) | .2 | (1) | .2 | (1) |
| Hats, caps, and millinery | (1) | (1) | - | - | (1) | (1) | (1) | (1) |
| Children's outerwear | .2 | (1) | - | - | .1 | (1) | .1 | (1) |
| Fur goods | - | - | - | - | - | - | - | - |
| Miscellaneous apparel and accessories | .1 | (1) | - | - | (1) | (1) | .1 | (1) |
| Miscellaneous fabricated textile products | 1.1 | .1 | .1 | 0.1 | .7 | .1 | .4 | .1 |
| Paper and allied products | 19.4 | 1.4 | 3.4 | 2.4 | 9.2 | 1.4 | 6.8 | 1.3 |
| Pulp mills | .9 | .1 | .2 | .1 | .3 | (1) | .4 | .1 |
| Paper mills, except building paper mills | 6.8 | .5 | 1.0 | .7 | 3.1 | .5 | 2.7 | .5 |
| Paperboard mills | 2.0 | .1 | .3 | .2 | 1.0 | .1 | .7 | .1 |
| Converted paper and paperboard products | 7.9 | .6 | 1.6 | 1.2 | 4.0 | .6 | 2.2 | .4 |
| Paperboard containers and boxes | 1.6 | .1 | .3 | .2 | .7 | .1 | .6 | .1 |
| Building paper and board mills | .3 | (1) | (1) | (1) | .1 | (1) | .1 | (1) |
| Printing and publishing | 13.2 | 1.0 | 3.2 | 2.3 | 1.3 | .2 | 8.7 | 1.6 |
| Newspapers | 3.0 | .2 | .9 | .7 | .3 | (1) | 1.7 | .3 |
| Periodicals | 2.1 | .2 | .7 | .5 | .1 | (1) | 1.3 | .2 |
| Books | 1.8 | .1 | .7 | .5 | .1 | (1) | 1.0 | .2 |
| Miscellaneous publishing | 1.6 | .1 | .2 | .1 | (1) | (1) | 1.4 | .3 |
| Commercial printing | 3.0 | .2 | .4 | .3 | .4 | .1 | 2.1 | .4 |
| Manifold business forms | .7 | .1 | .1 | .1 | .2 | (1) | .3 | .1 |
| Greeting card publishing | .2 | (1) | - | - | .1 | (1) | .1 | (1) |
| Blankbooks and bookbinding | .3 | (1) | .1 | (1) | .1 | (1) | .2 | (1) |
| Printing trade services | .6 | (1) | .1 | .1 | (1) | (1) | .4 | .1 |
| Chemicals | 156.9 | 11.6 | 51.0 | 35.7 | 44.7 | 6.7 | 61.2 | 11.3 |
| Industrial inorganic chemicals | 23.6 | 1.7 | 4.7 | 3.3 | 8.8 | 1.3 | 10.1 | 1.9 |
| Plastic and synthetic materials and manmade fibers | 24.7 | 1.8 | 4.5 | 3.1 | 10.3 | 1.5 | 10.0 | 1.8 |
| Drugs | 39.2 | 2.9 | 21.7 | 15.2 | 4.5 | .7 | 13.0 | 2.4 |
| Soap, detergents, cosmetics, and toilet goods | 10.7 | .8 | 3.9 | 2.7 | 2.5 | .4 | 4.3 | .8 |
| Paints and allied products | 7.1 | .5 | 3.0 | 2.1 | 1.1 | .2 | 2.9 | .5 |
| Industrial organic chemicals | 34.6 | 2.6 | 8.9 | 6.3 | 11.8 | 1.8 | 13.9 | 2.6 |
| Agricultural chemicals | 5.4 | .4 | 1.3 | .9 | 2.0 | .3 | 2.1 | .4 |
| Miscellaneous chemical products | 11.6 | .9 | 3.0 | 2.1 | 3.6 | .5 | 5.0 | .9 |
| Refined petroleum products | 26.4 | 1.9 | 5.3 | 3.7 | 10.6 | 1.6 | 10.5 | 1.9 |
| Petroleum refining | 25.0 | 1.9 | 4.8 | 3.4 | 10.5 | 1.6 | 9.8 | 1.8 |
| Paving and roofing materials | .6 | (1) | .1 | .1 | .1 | (1) | .4 | .1 |
| Miscellaneous petroleum and coal products | .7 | .1 | .3 | .2 | .1 | (1) | .3 | .1 |
| Rubber and plastic products | 24.3 | 1.8 | 2.3 | 1.6 | 12.0 | 1.8 | 10.0 | 1.9 |

See footnotes at end of table.

TABLE D-1. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN MANUFACTURING INDUSTRIES BY MAJOR OCCUPATIONAL GROUP AND DETAILED INDUSTRY OF EMPLOYMENT: 1983--con.
[Numbers in thousands]

| Industry | Scientists, engineers, and technicians | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Total | Percent | Scientists | Percent | Engineers | Percent | Technicians | Percent |
| Tires and inner tubes | 7.5 | 0.6 | 0.9 | 0.6 | 4.2 | 0.6 | 2.4 | 0.4 |
| Rubber and plastics footwear | .1 | (1) | (1) | (1) | (1) | (1) | .1 | (1) |
| Reclaimed rubber | (1) | (1) | - | - | (1) | (1) | (1) | (1) |
| Rubber and plastic hose and belting | .9 | .1 | .1 | (1) | .4 | .1 | .4 | .1 |
| Fabricated rubber products, n.e.c | 4.2 | .3 | .4 | .3 | 1.6 | .2 | 2.2 | .4 |
| Miscellaneous plastic products | 11.6 | .9 | .9 | .6 | 5.7 | .9 | 5.0 | .9 |
| Leather products | 1.4 | .1 | .2 | .2 | .5 | .1 | .6 | .1 |
| Leather tanning and finishing | .1 | (1) | (1) | (1) | .1 | (1) | (1) | (1) |
| Boot and shoe cut stock and findings | .1 | (1) | (1) | (1) | (1) | (1) | (1) | (1) |
| Footwear, except rubber | .9 | .1 | .2 | .1 | .4 | .1 | .4 | .1 |
| Leather gloves and mittens | - | - | - | - | - | - | - | - |
| Luggage | .1 | (1) | (1) | (1) | .1 | (1) | .1 | (1) |
| Handbags and personal leather goods | .1 | (1) | (1) | (1) | (1) | (1) | .1 | (1) |
| Leather goods, n.e.c | (1) | (1) | - | - | (1) | (1) | (1) | (1) |

- No amount available
(1) Value is less than .05 for numbers and less than .005 for percents.
NOTE: Because of rounding, components may not add to totals.
SOURCES: Bureau of Labor Statistics and the National Science Foundation.

TABLE D-2. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN MANUFACTURING INDUSTRIES, BY DETAILED OCCUPATION AND BROAD INDUSTRY GROUP OF EMPLOYMENT: 1983
[Numbers in thousands]

| Industry | All fields | Scientists | | | | | Engineers | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Total | Physical | Mathematical | Life | Computer specialist | Total | Aeronautical | Chemical | Civil | Electrical/ Electronic | Mechanical | Industrial | Sales |
| Total manufacturing | 1353.7 | 142.9 | 57.2 | 12.0 | 15.3 | 58.3 | 669.2 | 29.1 | 36.0 | 8.5 | 205.7 | 134.2 | 89.2 | 26.3 |
| DURABLE GOODS | 1063.5 | 66.6 | 13.4 | 9.9 | 1.5 | 41.7 | 576.6 | 29.1 | 8.5 | 6.3 | 199.8 | 112.4 | 75.1 | 21.8 |
| Lumber and wood products | 5.9 | 1.3 | (1) | - | .8 | .4 | 1.6 | - | - | - | - | .5 | .3 | - |
| Furniture and fixtures | 5.7 | .4 | - | - | (1) | .4 | 2.1 | - | - | - | - | .6 | 1.1 | - |
| Stone, clay, and glass products | 17.0 | 1.9 | .9 | - | - | 1.0 | 7.4 | - | .7 | .5 | .7 | 1.9 | 1.4 | .5 |
| Primary metals | 37.3 | 4.1 | 1.7 | .3 | - | 2.1 | 18.5 | - | .4 | .5 | 1.8 | 3.9 | 3.1 | 1.0 |
| Fabricated metal products | 65.0 | 3.1 | .9 | .3 | - | 1.9 | 32.9 | - | .4 | 1.1 | 2.0 | 15.1 | 3.9 | 2.2 |
| Machinery, except electrical | 258.2 | 16.5 | 1.6 | 2.8 | - | 12.1 | 130.3 | - | 1.1 | .8 | 43.4 | 38.2 | 20.9 | 7.6 |
| Electrical machinery | 314.9 | 15.1 | 3.1 | 1.4 | .1 | 10.5 | 173.2 | - | 3.3 | .7 | 106.1 | 19.4 | 18.7 | 5.7 |
| Transportation equipment | 249.7 | 16.4 | 2.0 | 4.7 | - | 9.7 | 158.7 | 29.1 | 1.3 | 2.8 | 20.9 | 24.4 | 19.3 | 1.7 |
| Instruments | 103.1 | 7.0 | 3.0 | .4 | .6 | 3.0 | 49.8 | - | 1.3 | - | 24.8 | 7.4 | 5.5 | 3.0 |
| Miscellaneous manufacturing | 6.7 | .8 | .2 | - | - | .6 | 2.2 | - | - | - | - | 1.0 | .7 | - |
| NONDURABLE GOODS | 290.2 | 76.2 | 43.8 | 2.0 | 13.8 | 16.6 | 92.6 | - | 27.5 | 2.1 | 5.9 | 21.9 | 14.1 | 4.5 |
| Food and food products | 31.1 | 8.3 | 4.1 | - | 2.2 | 1.9 | 7.7 | - | .6 | - | - | 3.1 | 2.1 | - |
| Tobacco products | 1.9 | .2 | .2 | - | - | (1) | .8 | - | - | - | - | .2 | (1) | - |
| Textiles | 11.2 | 1.6 | .8 | - | - | .9 | 3.7 | - | .3 | - | - | .8 | 2.1 | - |
| Apparel | 4.6 | .7 | (1) | - | - | .6 | 2.1 | - | (1) | - | - | .2 | 1.6 | - |
| Paper and allied products | 19.4 | 3.4 | 2.2 | - | .1 | 1.1 | 9.2 | - | 1.9 | - | .6 | 2.1 | 1.4 | - |
| Printing and publishing | 13.2 | 3.2 | (1) | .2 | - | 2.9 | 1.3 | - | - | - | - | .5 | .5 | - |
| Chemicals | 156.9 | 51.0 | 31.8 | 1.6 | 11.5 | 6.2 | 44.7 | - | 17.7 | 1.6 | 3.5 | 8.3 | 3.4 | 3.8 |
| Refined petroleum products | 26.4 | 5.3 | 3.4 | .1 | (1) | 1.7 | 10.6 | - | 4.5 | .6 | .8 | 2.4 | .8 | - |
| Rubber and plastic products | 24.3 | 2.3 | 1.3 | - | (1) | 1.0 | 12.0 | - | 2.6 | - | 1.0 | 4.0 | 2.0 | .7 |
| Leather products | 1.4 | .2 | .1 | - | - | .2 | .5 | - | (1) | - | - | .1 | .2 | - |

See footnotes at end of table.

TABLE D-2. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN MANUFACTURING INDUSTRIES, BY DETAILED OCCUPATION AND BROAD INDUSTRY GROUP OF EMPLOYMENT: 1983--con.
[Numbers in thousands]

| Industry | Engineers | Technicians | | | | | |
|---|---|---|---|---|---|---|---|
| | Other | Total | Programmer | Drafter | Engineering | Mechanical | Science |
| Total manufacturing | 140.3 | 541.7 | 79.6 | 119.3 | 254.5 | 36.4 | 88.2 |
| DURABLE GOODS | 123.7 | 420.2 | 62.0 | 108.6 | 231.7 | 32.8 | 18.0 |
| Lumber and wood products | .8 | 3.1 | .6 | 1.6 | .5 | (1) | .4 |
| Furniture and fixtures | .4 | 3.1 | .6 | 1.9 | .6 | .1 | - |
| Stone, clay, and glass products | 1.7 | 7.8 | .9 | 2.3 | 2.4 | .5 | 2.1 |
| Primary metals | 7.7 | 14.7 | 2.0 | 2.8 | 6.8 | .7 | 3.2 |
| Fabricated metal products | 8.2 | 28.9 | 3.1 | 17.9 | 7.1 | 1.9 | .9 |
| Machinery, except electrical | 18.2 | 111.4 | 25.6 | 31.0 | 52.8 | 7.6 | 2.0 |
| Electrical machinery | 19.3 | 126.6 | 15.4 | 23.3 | 85.2 | 8.0 | 2.7 |
| Transportation equipment | 59.1 | 74.6 | 8.9 | 17.7 | 45.1 | 8.3 | 2.8 |
| Instruments | 7.7 | 46.4 | 4.2 | 8.5 | 30.1 | 5.4 | 3.5 |
| Miscellaneous manufacturing | .5 | 3.7 | .7 | 1.6 | 1.1 | .2 | .3 |
| NONDURABLE GOODS | 16.6 | 121.4 | 17.6 | 10.8 | 22.8 | 3.6 | 70.2 |
| Food and food products | 2.0 | 15.1 | 2.7 | .7 | 1.3 | .2 | 10.4 |
| Tobacco products | .5 | .9 | (1) | .1 | .3 | - | .5 |
| Textiles | .6 | 5.8 | 1.0 | .2 | 1.9 | .2 | 2.8 |
| Apparel | .3 | 1.9 | .9 | .1 | .9 | (1) | (1) |
| Paper and allied products | 3.1 | 6.8 | 1.0 | .9 | 2.8 | .3 | 2.1 |
| Printing and publishing | .3 | 8.7 | 4.7 | 2.9 | 1.0 | - | (1) |
| Chemicals | 6.5 | 61.2 | 4.3 | 3.5 | 9.0 | 1.4 | 44.4 |
| Refined petroleum products | 1.4 | 10.5 | 1.4 | .9 | 1.9 | .4 | 6.3 |
| Rubber and plastic products | 1.7 | 10.0 | 1.4 | 1.5 | 3.6 | 1.1 | 3.5 |
| Leather products | .2 | .6 | .3 | (1) | .2 | (1) | .1 |

- No amount available
(1) Value is less than .05.
NOTE: Because of rounding, components may not add to totals.
SOURCES: Bureau of Labor Statistics and the National Science Foundation.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983

Meat products (SIC 2010)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 3,188 | 0.83 | (1) |
| Engineers | 965 | .25 | (1) |
| Agricultural | 21 | (1) | 20.20 |
| Chemical | 16 | (1) | 37.81 |
| Industrial | 413 | .12 | 8.61 |
| Mechanical | 339 | .09 | 8.74 |
| Safety | 62 | .01 | 11.26 |
| Other, n.e.c. | 114 | .03 | (1) |
| Scientists | 700 | .19 | (1) |
| Chemists | 256 | .07 | 11.86 |
| All other physical scientists | 52 | .01 | 17.06 |
| Agricultural scientists | 142 | .04 | 20.57 |
| All other life scientists | 75 | .02 | (1) |
| Computer specialists | 175 | .05 | 13.03 |
| Technicians | 1,523 | .39 | (1) |
| Computer programmer | 289 | .08 | 10.33 |
| Drafter | 68 | .01 | 16.23 |
| Mechanical engineering technician | 30 | (1) | 27.56 |
| Tool programmer, numerical controls | 7 | (1) | 28.92 |
| Industrial engineering technicians | 59 | .01 | 14.05 |
| All other engineering technicians | 60 | .01 | 20.06 |
| Biological science technicians | 634 | .18 | 14.03 |
| Chemical technicians, except health | 247 | .07 | 14.35 |
| All other physical and life science technicians | 129 | .03 | 19.34 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Dairy products (SIC 2020)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 3,851 | 2.25 | (1) |
| Engineers | 808 | .45 | (1) |
| Agricultural | 9 | (1) | 36.00 |
| Chemical | 34 | .02 | 41.80 |
| Industrial | 182 | .10 | 16.65 |
| Mechanical | 428 | .25 | 13.14 |
| Safety | 8 | (1) | 30.10 |
| Other, n.e.c. | 147 | .08 | (1) |
| Scientists | 1,078 | .61 | (1) |
| Chemists | 266 | .15 | 20.09 |
| All other physical scientists | 21 | .01 | 32.61 |
| Biological scientists | 241 | .14 | 20.01 |
| All other life scientists | 260 | .14 | (1) |
| Computer specialists | 290 | .17 | 23.86 |
| Technicians | 1,965 | 1.13 | (1) |
| Computer programmer | 449 | .26 | 25.23 |
| Drafter | 68 | .04 | 25.81 |
| Mechanical engineering technician | 31 | .01 | 35.46 |
| Industrial engineering technicians | 21 | .01 | 26.25 |
| All other engineering technicians | 41 | .02 | 34.91 |
| Biological science technicians | 682 | .40 | 8.18 |
| Chemical technicians, except health | 511 | .30 | 10.36 |
| All other physical and life science technicians | 162 | .09 | 15.17 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Preserved fruits and vegetables (SIC 2030)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 5,165 | 2.14 | (1) |
| Engineers | 973 | .39 | (1) |
| Agricultural | 59 | .02 | 21.32 |
| Chemical | 85 | .03 | 30.13 |
| Industrial | 376 | .16 | 13.91 |
| Mechanical | 287 | .12 | 8.19 |
| Safety | 33 | .01 | 14.18 |
| Other, n.e.c | 133 | .05 | (1) |
| Scientists | 1,168 | .47 | (1) |
| Chemists | 256 | .11 | 15.16 |
| All other physical scientists | 44 | .01 | 19.25 |
| Agricultural scientists | 309 | .13 | 15.92 |
| Biological scientists | 200 | .08 | 18.97 |
| All other life scientists | 44 | .01 | 22.51 |
| Computer specialists | 315 | .13 | 12.21 |
| Technicians | 3,024 | 1.28 | (1) |
| Computer programmer | 372 | .16 | 9.14 |
| Drafter | 185 | .08 | 17.94 |
| Mechanical engineering technician | 42 | .01 | 22.11 |
| Tool programmer, numerical controls | 12 | (1) | 33.33 |
| Industrial engineering technicians | 82 | .03 | 29.47 |
| All other engineering technicians | 146 | .06 | 16.65 |
| Biological science technicians | 1,039 | .45 | 10.09 |
| Chemical technicians, except health | 763 | .33 | 9.71 |
| All other physical and life science technicians | 383 | .16 | 19.01 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Grain mill products (SIC 2040)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 4,343 | 3.19 | (1) |
| Engineers | 918 | .66 | (1) |
| Agricultural | 28 | .02 | 25.92 |
| Chemical | 162 | .12 | 21.91 |
| Industrial | 158 | .11 | 9.29 |
| Mechanical | 338 | .25 | 13.72 |
| Safety | 38 | .02 | 19.79 |
| Other, n.e.c | 194 | .14 | (1) |
| Scientists | 1,496 | 1.12 | (1) |
| Chemists | 964 | .73 | 10.41 |
| All other physical scientists | 69 | .05 | 35.87 |
| Agricultural scientists | 74 | .05 | 21.40 |
| Biological scientists | 84 | .06 | 19.63 |
| All other life scientists | 66 | .05 | 26.30 |
| Computer specialists | 239 | .18 | 19.59 |
| Technicians | 1,929 | 1.41 | (1) |
| Computer programmer | 350 | .26 | 21.40 |
| Drafter | 96 | .07 | 16.66 |
| Tool programmer, numerical controls | 9 | (1) | 38.32 |
| Industrial engineering technicians | 36 | .02 | 18.13 |
| All other engineering technicians | 144 | .09 | (1) |
| Biological science technicians | 386 | .29 | 12.30 |
| Chemical technicians, except health | 635 | .48 | 13.13 |
| All other physical and life science technicians | 273 | .20 | 26.18 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Bakery products (SIC 2050)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 1,376 | 0.56 | (1) |
| Engineers | 702 | .31 | (1) |
| Industrial | 113 | .05 | 11.21 |
| Mechanical | 504 | .23 | 9.37 |
| Safety | 23 | .01 | 18.03 |
| Other, n.e.c. | 62 | .02 | (1) |
| Scientists | 153 | .06 | (1) |
| Physical scientists | 49 | .02 | (1) |
| Life scientists | 15 | (1) | (1) |
| Computer specialists | 89 | .04 | 13.85 |
| Technicians | 521 | .19 | (1) |
| Computer programmer | 163 | .07 | 11.25 |
| Drafter | 49 | .02 | 24.35 |
| Mechanical engineering technician | 15 | (1) | 30.25 |
| Tool programmer, numerical controls | 12 | (1) | 25.27 |
| Industrial engineering technicians | 4 | (1) | 41.83 |
| All other engineering technicians | 86 | .03 | 26.93 |
| Biological science technicians | 104 | .04 | 23.60 |
| All other physical and life science technicians | 88 | .03 | (1) |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Sugar and confectionery products (SIC 2060)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 3,326 | 3.36 | (1) |
| Engineers | 867 | .87 | (1) |
| Agricultural | 27 | .02 | 38.98 |
| Chemical | 80 | .08 | 20.25 |
| Industrial | 219 | .22 | 11.35 |
| Mechanical | 272 | .28 | 8.33 |
| Safety | 80 | .08 | 25.04 |
| Other, n.e.c | 189 | .19 | (1) |
| Scientists | 786 | .80 | (1) |
| Chemists | 397 | .41 | 7.35 |
| All other physical scientists | 32 | .03 | 35.80 |
| Agricultural scientists | 50 | .05 | 22.70 |
| Biological scientists | 72 | .07 | 20.41 |
| All other life scientists | 52 | .05 | 39.22 |
| Computer specialists | 183 | .19 | 13.53 |
| Technicians | 1,673 | 1.69 | (1) |
| Computer programmer | 196 | .20 | 13.54 |
| Drafter | 129 | .13 | 9.44 |
| Mechanical engineering technician | 22 | .02 | 17.48 |
| Tool programmer, numerical controls | 8 | (1) | 31.62 |
| Industrial engineering technicians | 25 | .02 | 26.22 |
| All other engineering technicians | 57 | .05 | 24.07 |
| Biological science technicians | 441 | .45 | 13.48 |
| Chemical technicians, except health | 545 | .56 | 12.78 |
| All other physical and life science technicians | 250 | .26 | 16.97 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Fats and oils (SIC 2070)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 1,303 | 3.26 | (1) |
| Engineers | 364 | .90 | (1) |
| Chemical | 61 | .15 | 24.69 |
| Industrial | 34 | .08 | 28.27 |
| Safety | 12 | .03 | 24.86 |
| Other, n.e.c. | 257 | .64 | (1) |
| Scientists | 418 | 1.05 | (1) |
| Chemists | 344 | .88 | 11.31 |
| All other physical scientists | 4 | .01 | 43.30 |
| Biological scientists | 11 | .02 | 26.81 |
| All other life scientists | 31 | .07 | (1) |
| Computer specialists | 28 | .07 | 30.88 |
| Technicians | 521 | 1.31 | (1) |
| Computer programmer | 74 | .19 | 29.50 |
| Drafter | 25 | .06 | 22.55 |
| All other engineering technicians | 9 | .02 | (1) |
| Biological science technicians | 85 | .21 | 34.86 |
| Chemical technicians, except health | 309 | .79 | 11.52 |
| All other physical and life science technicians | 19 | .04 | 43.11 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Beverages (SIC 2080)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 5,290 | 2.23 | (1) |
| Engineers | 1,336 | .57 | (1) |
| Agricultural | 6 | (1) | 34.96 |
| Chemical | 29 | .01 | 18.79 |
| Industrial | 240 | .10 | 12.01 |
| Mechanical | 737 | .32 | 30.32 |
| Safety | 71 | .03 | 19.46 |
| Other, n.e.c. | 253 | .11 | (1) |
| Scientists | 1,420 | .59 | (1) |
| Chemists | 744 | .32 | 10.08 |
| All other physical scientists | 43 | .01 | 17.43 |
| Agricultural scientists | 123 | .05 | 23.08 |
| Biological scientists | 95 | .04 | 14.33 |
| All other life scientists | 50 | .02 | 28.81 |
| Computer specialists | 365 | .15 | 14.29 |
| Technicians | 2,534 | 1.07 | (1) |
| Computer programmer | 562 | .24 | 11.97 |
| Drafter | 94 | .04 | 15.02 |
| Mechanical engineering technician | 29 | .01 | 26.48 |
| Tool programmer, numerical controls | 19 | (1) | 43.65 |
| Industrial engineering technicians | 50 | .02 | 30.12 |
| All other engineering technicians | 147 | .06 | 38.27 |
| Biological science technicians | 416 | .18 | 19.16 |
| Chemical technicians, except health | 1,174 | .51 | 9.57 |
| All other physical and life science technicians | 43 | .01 | 25.60 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Miscellaneous food and kindred products (SIC 2090)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 3,250 | 1.82 | (1) |
| Engineers | 793 | .44 | (1) |
| Agricultural | 7 | (1) | 38.06 |
| Chemical | 90 | .05 | 35.79 |
| Industrial | 325 | .19 | 25.25 |
| Mechanical | 235 | .13 | 9.92 |
| Safety | 26 | .01 | 16.36 |
| Other, n.e.c. | 110 | .06 | (1) |
| Scientists | 1,036 | .58 | (1) |
| Chemists | 577 | .34 | 9.89 |
| All other physical scientists | 6 | (1) | 30.27 |
| Agricultural scientists | 164 | .09 | 33.30 |
| Biological scientists | 67 | .03 | 29.19 |
| All other life scientists | 13 | (1) | 38.92 |
| Computer specialists | 209 | .12 | 18.58 |
| Technicians | 1,421 | .80 | (1) |
| Computer programmer | 174 | .10 | 18.44 |
| Drafter | 21 | .01 | 22.48 |
| Tool programmer, numerical controls | 10 | (1) | 28.98 |
| Industrial engineering technicians | 19 | .01 | 25.56 |
| All other engineering technicians | 115 | .06 | (1) |
| Biological science technicians | 534 | .31 | 28.39 |
| Chemical technicians, except health | 282 | .16 | 14.91 |
| All other physical and life science technicians | 266 | .15 | 34.92 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Cigarettes (SIC 2110)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 1,826 | 4.40 | (1) |
| Engineers | 730 | 1.52 | (1) |
| Industrial | 50 | .10 | 6.16 |
| Mechanical | 225 | .47 | 16.45 |
| Other, n.e.c. | 455 | .95 | (1) |
| Scientists | 228 | .47 | (1) |
| Physical scientists | 228 | .47 | (1) |
| Technicians | 868 | 1.79 | (1) |
| Drafter | 66 | .13 | 13.93 |
| Industrial engineering technicians | 28 | .05 | 9.31 |
| All other engineering technicians | 247 | .51 | (1) |
| Physical and life science technicians | 527 | 1.10 | (1) |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Cigars (SIC 2120)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 20 | 0.35 | (1) |
| Engineers | 20 | .35 | (1) |
| Field unspecified | 20 | .35 | (1) |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Tobacco (chewing and smoking) (SIC 2130)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 7 | 0.98 | (1) |
| Scientists | 7 | .19 | (1) |
| Physical scientists | 7 | .19 | (1) |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Tobacco stemming and redrying (SIC 2140)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 51 | 0.86 | (1) |
| Engineers | 24 | .40 | (1) |
| Field unspecified | 24 | .40 | (1) |
| Scientists | 6 | .10 | (1) |
| Computer specialists | 6 | .10 | 26.35 |
| Technicians | 21 | .36 | (1) |
| Computer programmer | 10 | .17 | 25.88 |
| Physical and life science technicians | 11 | .19 | (1) |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Weaving mills, cotton (SIC 2210)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 2,220 | 1.79 | (1) |
| Engineers | 641 | .49 | (1) |
| Industrial | 449 | .36 | 11.79 |
| Mechanical | 144 | .11 | 15.18 |
| Safety | 21 | .01 | 22.88 |
| Other, n.e.c. | 27 | .01 | (1) |
| Scientists | 385 | .29 | (1) |
| Chemists | 61 | .04 | 26.65 |
| All other physical scientists | 6 | (1) | 34.56 |
| Computer specialists | 318 | .25 | 23.89 |
| Technicians | 1,194 | .95 | (1) |
| Computer programmer | 271 | .22 | 22.04 |
| Drafter | 24 | .01 | 18.91 |
| Mechanical engineering technician | 13 | .01 | 24.20 |
| Industrial engineering technicians | 425 | .34 | 11.41 |
| All other engineering technicians | 38 | .03 | 24.57 |
| Physical and life science technicians | 423 | .34 | (1) |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Weaving mills, manmade fibers (SIC 2220)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 1,455 | 1.56 | (1) |
| Engineers | 550 | .59 | (1) |
| Industrial | 332 | .37 | 6.69 |
| Mechanical | 106 | .11 | 14.35 |
| Safety | 4 | (1) | 33.54 |
| Other, n.e.c. | 108 | .11 | (1) |
| Scientists | 216 | .23 | (1) |
| Physical scientists | 76 | .08 | (1) |
| Computer specialists | 140 | .15 | 22.64 |
| Technicians | 689 | .73 | (1) |
| Computer programmer | 89 | .09 | 21.67 |
| Drafter | 14 | .01 | 19.69 |
| Mechanical engineering technician | 39 | .04 | 17.94 |
| Industrial engineering technicians | 223 | .24 | 6.73 |
| All other engineering technicians | 56 | .06 | 21.33 |
| Chemical technicians, except health | 237 | .26 | 11.86 |
| All other physical and life science technicians | 31 | .03 | 26.85 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Weaving and finishing mills, wool (SIC 2230)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 282 | 1.61 | (1) |
| Engineers | 120 | .69 | (1) |
| Industrial | 33 | .19 | 22.67 |
| Mechanical | 28 | .16 | 29.34 |
| Other, n.e.c. | 59 | .34 | (1) |
| Scientists | 29 | .16 | (1) |
| Chemists | 18 | .10 | 25.27 |
| Computer specialists | 11 | .06 | 40.24 |
| Technicians | 133 | .76 | (1) |
| Computer programmer | 28 | .16 | 28.70 |
| Engineering technicians | 49 | .27 | (1) |
| Chemical technicians, except health | 56 | .33 | 25.64 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Narrow fabric mills (SIC 2240)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 199 | 0.80 | (1) |
| Engineers | 102 | .43 | (1) |
| Field unspecified | 102 | .43 | (1) |
| Scientists | 14 | .04 | (1) |
| Physical scientists | 10 | .03 | (1) |
| Computer specialists | 4 | .01 | 28.50 |
| Technicians | 83 | .33 | (1) |
| Computer programmer | 20 | .08 | 8.21 |
| Engineering technicians | 34 | .13 | (1) |
| Physical and life science technicians | 29 | .12 | (1) |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Knitting mills (SIC 2250)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 1,420 | 0.69 | (1) |
| Engineers | 524 | .23 | (1) |
| Chemical | 37 | .01 | 29.44 |
| Industrial | 330 | .16 | 10.92 |
| Mechanical | 94 | .04 | 31.48 |
| Safety | 36 | .01 | 18.19 |
| Other, n.e.c | 27 | .01 | (1) |
| Scientists | 249 | .11 | (1) |
| Physical scientists | 94 | .04 | (1) |
| Computer specialists | 155 | .07 | 22.70 |
| Technicians | 647 | .30 | (1) |
| Computer programmer | 226 | .11 | 15.13 |
| Drafter | 21 | .01 | 39.72 |
| Industrial engineering technicians | 222 | .11 | 13.92 |
| All other engineering technicians | 19 | (1) | (1) |
| Physical and life science technicians | 159 | .07 | (1) |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Textile finishing, except wool and knit goods (SIC 2260)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 1,701 | 2.66 | (1) |
| Engineers | 401 | .62 | (1) |
| Chemical | 27 | .04 | 21.81 |
| Industrial | 209 | .33 | 7.20 |
| Mechanical | 141 | .22 | 11.93 |
| Safety | 7 | .01 | 27.84 |
| Other, n.e.c | 17 | .02 | (1) |
| Scientists | 268 | .41 | (1) |
| Physical scientists | 234 | .36 | (1) |
| Computer specialists | 34 | .05 | 14.76 |
| Technicians | 1,032 | 1.59 | (1) |
| Computer programmer | 47 | .07 | 16.17 |
| Drafter | 25 | .03 | 16.04 |
| Mechanical engineering technician | 16 | .02 | 25.54 |
| Industrial engineering technicians | 78 | .12 | 11.74 |
| All other engineering technicians | 23 | .03 | 30.68 |
| Physical and life science technicians | 843 | 1.32 | (1) |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Floor covering mills (SIC 2270)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 975 | 2.11 | (1) |
| Engineers | 369 | .75 | (1) |
| Chemical | 27 | .05 | 43.38 |
| Industrial | 256 | .53 | 25.87 |
| Mechanical | 48 | .10 | 28.70 |
| Safety | 17 | .03 | 23.00 |
| Other, n.e.c | 21 | .04 | (1) |
| Scientists | 164 | .34 | (1) |
| Chemists | 68 | .14 | 36.74 |
| Computer specialists | 96 | .20 | 34.20 |
| Technicians | 442 | .89 | (1) |
| Computer programmer | 133 | .27 | 23.96 |
| Drafter | 20 | .04 | 31.81 |
| Mechanical engineering technician | 21 | .04 | 58.18 |
| Industrial engineering technicians | 65 | .13 | 20.17 |
| All other engineering technicians | 22 | .04 | 55.37 |
| Chemical technicians, except health | 171 | .35 | 25.97 |
| All other physical and life science technicians | 10 | .02 | 65.80 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Yarn and thread mills (SIC 2280)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 1,226 | 1.03 | (1) |
| Engineers | 504 | .43 | (1) |
| Chemical | 50 | .04 | 32.34 |
| Industrial | 278 | .25 | 6.82 |
| Mechanical | 137 | .12 | 12.77 |
| Safety | 30 | .02 | 18.61 |
| Other, n.e.c | 9 | (1) | (1) |
| Scientists | 88 | .06 | (1) |
| Physical scientists | 24 | .01 | (1) |
| Computer specialists | 64 | .05 | 19.24 |
| Technicians | 634 | .54 | (1) |
| Computer programmer | 89 | .08 | 21.65 |
| Drafter | 15 | .01 | 30.03 |
| Mechanical engineering technician | 76 | .06 | 37.11 |
| Industrial engineering technicians | 201 | .18 | 9.63 |
| All other engineering technicians | 32 | .02 | 33.80 |
| Chemical technicians, except health | 175 | .15 | 31.80 |
| All other physical and life science technicians | 46 | .04 | 41.12 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Miscellaneous textile goods (SIC 2290)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 1,683 | 2.88 | (1) |
| Engineers | 526 | .88 | (1) |
| Chemical | 122 | .21 | 16.56 |
| Industrial | 172 | .29 | 16.76 |
| Mechanical | 139 | .23 | 8.56 |
| Safety | 20 | .03 | 13.22 |
| Other, n.e.c. | 73 | .12 | (1) |
| Scientists | 226 | .38 | (1) |
| Physical scientists | 165 | .28 | (1) |
| Computer specialists | 61 | .10 | 23.99 |
| Technicians | 931 | 1.57 | (1) |
| Computer programmer | 67 | .11 | 12.01 |
| Drafter | 46 | .07 | 13.24 |
| Mechanical engineering technician | 32 | .05 | 22.62 |
| Industrial engineering technicians | 38 | .06 | 14.62 |
| All other engineering technicians | 165 | .28 | 24.33 |
| Chemical technicians, except health | 575 | .99 | 11.04 |
| All other physical and life science technicians | 8 | .01 | 32.83 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Men's and boys' suits and coats (SIC 2310)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 247 | 0.35 | (1) |
| Engineers | 101 | .13 | (1) |
| Industrial | 88 | .12 | 11.85 |
| Other, n.e.c. | 13 | .01 | (1) |
| Scientists | 29 | .04 | (1) |
| Computer specialists | 29 | .04 | 23.46 |
| Technicians | 117 | .15 | (1) |
| Computer programmer | 66 | .09 | 26.89 |
| Engineering technicians | 51 | .06 | (1) |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Men's and boys' furnishings (SIC 2320)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 1,619 | 0.46 | (1) |
| Engineers | 605 | .17 | (1) |
| Industrial | 516 | .16 | 5.34 |
| Mechanical | 54 | .01 | 17.17 |
| Safety | 14 | (1) | 26.04 |
| Other, n.e.c | 21 | (1) | (1) |
| Scientists | 465 | .14 | (1) |
| Computer specialists | 465 | .14 | 39.02 |
| Technicians | 549 | .15 | (1) |
| Computer programmer | 302 | .09 | 15.78 |
| Mechanical engineering technician | 19 | (1) | 41.10 |
| Tool programmer, numerical controls | 16 | (1) | 36.17 |
| Industrial engineering technicians | 200 | .06 | 8.60 |
| All other engineering technicians | 12 | (1) | (1) |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Women's and misses' outerwear (SIC 2330)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 845 | 0.18 | (1) |
| Engineers | 372 | .08 | (1) |
| Industrial | 333 | .08 | 7.86 |
| Mechanical | 27 | (1) | 27.79 |
| Other, n.e.c | 12 | (1) | (1) |
| Scientists | 64 | .01 | (1) |
| Computer specialists | 64 | .01 | 14.21 |
| Technicians | 409 | .09 | (1) |
| Computer programmer | 200 | .05 | 15.04 |
| Drafter | 21 | (1) | 29.62 |
| Industrial engineering technicians | 174 | .04 | 10.21 |
| All other engineering technicians | 14 | (1) | (1) |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Women's and children's ungergarments (SIC 2340)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 398 | 0.43 | (1) |
| Engineers | 189 | .21 | (1) |
| Industrial | 152 | .18 | 8.44 |
| Mechanical | 17 | .02 | 24.60 |
| Other, n.e.c | 20 | .01 | (1) |
| Scientists | 22 | .02 | (1) |
| Computer specialists | 22 | .02 | 21.46 |
| Technicians | 187 | .20 | (1) |
| Computer programmer | 59 | .07 | 18.00 |
| Industrial engineering technicians | 80 | .09 | 12.03 |
| All other engineering technicians | 48 | .04 | (1) |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Hats, caps, and millinery (SIC 2350)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 20 | 0.13 | (1) |
| Engineers | 11 | .05 | (1) |
| Mechanical | 6 | .03 | 32.91 |
| Other, n.e.c | 5 | .02 | (1) |
| Technicians | 9 | .05 | (1) |
| Computer programmer | 9 | .05 | 19.56 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Children's outerwear (SIC 2360)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 218 | 0.40 | (1) |
| Engineers | 107 | .17 | (1) |
| Industrial | 84 | .14 | 7.30 |
| Other, n.e.c | 23 | .03 | (1) |
| Technicians | 111 | .17 | (1) |
| Computer programmer | 40 | .06 | 18.11 |
| Engineering technicians | 71 | .11 | (1) |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Miscellaneous apparel and accessories (SIC 2380)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 114 | 0.23 | (1) |
| Engineers | 50 | .09 | (1) |
| Field unspecified | 50 | .09 | (1) |
| Technicians | 64 | .12 | (1) |
| Computer programmer | 34 | .07 | 18.76 |
| Engineering technicians | 30 | .05 | (1) |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Miscellaneous fabricated textile products (SIC 2390)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 1,142 | 0.60 | (1) |
| Engineers | 654 | .36 | (1) |
| Chemical | 15 | (1) | 30.03 |
| Industrial | 387 | .23 | 16.21 |
| Mechanical | 133 | .07 | 11.77 |
| Safety | 14 | (1) | 16.90 |
| Other, n.e.c | 105 | .06 | (1) |
| Scientists | 74 | .03 | (1) |
| Physical scientists | 8 | (1) | (1) |
| Computer specialists | 66 | .03 | 9.85 |
| Technicians | 414 | .21 | (1) |
| Computer programmer | 152 | .09 | 8.26 |
| Drafter | 64 | .03 | 13.84 |
| Mechanical engineering technician | 16 | (1) | 27.38 |
| Tool programmer, numerical controls | 20 | .01 | 31.89 |
| Industrial engineering technicians | 61 | .03 | 9.90 |
| All other engineering technicians | 81 | .04 | 22.02 |
| Physical and life science technicians | 20 | .01 | (1) |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Logging camps and contractors (SIC 2410)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 234 | 0.26 | (1) |
| Engineers | 45 | .04 | (1) |
| Field unspecified | 45 | .04 | (1) |
| Scientists | 72 | .09 | (1) |
| Foresters and conservation scientists | 72 | .09 | 16.95 |
| Technicians | 117 | .13 | (1) |
| Surveyor | 16 | .02 | 26.88 |
| Surveying and mapping technicians | 52 | .06 | 25.72 |
| All other engineering technicians | 36 | .04 | (1) |
| Biological science technicians | 13 | .01 | 35.41 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Sawmills and planing mills (SIC 2420)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 2,126 | 1.04 | (1) |
| Engineers | 526 | .26 | (1) |
| Mechanical | 123 | .06 | 26.99 |
| Safety | 24 | .01 | 16.50 |
| Other, n.e.c | 379 | .19 | (1) |
| Scientists | 810 | .40 | (1) |
| Foresters and conservation scientists | 505 | .26 | 10.84 |
| All other life scientists | 76 | .03 | (1) |
| Computer specialists | 229 | .11 | 28.94 |
| Technicians | 790 | .38 | (1) |
| Computer programmer | 307 | .16 | 25.42 |
| Drafter | 54 | .02 | 20.05 |
| Surveyor | 25 | .01 | 22.01 |
| Surveying and mapping technicians | 28 | .01 | 28.45 |
| Mechanical engineering technician | 5 | (1) | 35.77 |
| Industrial engineering technicians | 41 | .02 | 15.95 |
| All other engineering technicians | 42 | .02 | 19.32 |
| Physical and life science technicians | 288 | .14 | (1) |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Millwork, plywood, structural wood (SIC 2430)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 1,824 | 0.84 | (1) |
| Engineers | 514 | .24 | (1) |
| Industrial | 188 | .09 | 12.60 |
| Mechanical | 192 | .09 | 10.67 |
| Safety | 23 | .01 | 14.87 |
| Other, n.e.c | 111 | .05 | (1) |
| Scientists | 251 | .11 | (1) |
| Physical scientists | 8 | (1) | 33.07 |
| Life scientists | 130 | .06 | (1) |
| Computer specialists | 113 | .05 | 12.31 |
| Technicians | 1,059 | .49 | (1) |
| Computer programmer | 169 | .08 | 13.92 |
| Drafter | 739 | .37 | 7.61 |
| Mechanical engineering technician | 32 | .01 | 26.88 |
| Industrial engineering technicians | 54 | .02 | 18.20 |
| All other engineering technicians | 37 | .01 | 27.61 |
| Biological science technicians | 10 | (1) | 33.46 |
| All other physical and life science technicians | 18 | (1) | 29.91 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Wood containers (SIC 2440)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 42 | 0.08 | (1) |
| Engineers | 13 | .02 | (1) |
| Field unspecified | 13 | .02 | (1) |
| Scientists | 12 | .03 | (1) |
| Foresters and conservation scientists | 12 | .03 | 21.73 |
| Technicians | 17 | .03 | (1) |
| Computer programmer | 10 | .02 | 22.58 |
| Drafter | 7 | .01 | 46.51 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Wood buildings and mobile homes (SIC 2450)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 1,032 | 1.43 | (1) |
| Engineers | 186 | .24 | (1) |
| Industrial | 80 | .11 | 13.97 |
| Mechanical | 47 | .06 | 20.77 |
| Safety | 4 | (1) | 50.00 |
| Other, n.e.c. | 55 | .07 | (1) |
| Scientists | 19 | .02 | (1) |
| Computer specialists | 19 | .02 | 18.15 |
| Technicians | 827 | 1.17 | (1) |
| Computer programmer | 48 | .06 | 15.12 |
| Drafter | 707 | 1.02 | 6.94 |
| Industrial engineering technicians | 31 | .04 | 30.01 |
| All other engineering technicians | 41 | .05 | (1) |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Miscellaneous wood products (SIC 2490)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 666 | 0.83 | (1) |
| Engineers | 271 | .34 | (1) |
| Industrial | 65 | .08 | 9.52 |
| Mechanical | 91 | .12 | 7.82 |
| Safety | 10 | .01 | 21.44 |
| Other, n.e.c. | 105 | .13 | (1) |
| Scientists | 102 | .12 | (1) |
| Physical scientists | 18 | .02 | 27.72 |
| Life scientists | 51 | .06 | (1) |
| Computer specialists | 33 | .04 | 17.30 |
| Technicians | 293 | .37 | (1) |
| Computer programmer | 53 | .07 | 11.49 |
| Drafter | 88 | .11 | 21.16 |
| Industrial engineering technicians | 16 | .02 | 35.57 |
| All other engineering technicians | 55 | .07 | (1) |
| Physical and life science technicians | 81 | .10 | (1) |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Household furniture (SIC 2510)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 2,026 | 0.70 | (1) |
| Engineers | 906 | .32 | (1) |
| Industrial | 533 | .19 | 9.99 |
| Mechanical | 225 | .08 | 13.18 |
| Safety | 33 | .01 | 16.95 |
| Other, n.e.c. | 115 | .04 | (1) |
| Scientists | 180 | .06 | (1) |
| Foresters and conservation scientists | 5 | (1) | 43.81 |
| Computer specialists | 175 | .06 | 17.04 |
| Technicians | 940 | .32 | (1) |
| Computer programmer | 262 | .09 | 10.85 |
| Drafter | 392 | .14 | 10.54 |
| Mechanical engineering technician | 14 | (1) | 46.23 |
| Industrial engineering technicians | 181 | .06 | 11.43 |
| All other engineering technicians | 91 | .03 | 27.70 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Office furniture (SIC 2520)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 1,022 | 1.87 | (1) |
| Engineers | 459 | .84 | (1) |
| Industrial | 253 | .47 | 22.71 |
| Mechanical | 82 | .15 | 12.77 |
| Safety | 19 | .03 | 21.44 |
| Other, n.e.c | 105 | .19 | (1) |
| Scientists | 94 | .17 | (1) |
| Computer specialists | 94 | .17 | 20.93 |
| Technicians | 469 | .86 | (1) |
| Computer programmer | 137 | .25 | 19.88 |
| Drafter | 208 | .39 | 9.71 |
| Mechanical engineering technician | 17 | .03 | 30.45 |
| Industrial engineering technicians | 60 | .11 | 18.18 |
| All other engineering technicians | 47 | .08 | 26.23 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Public building and related furniture (SIC 2530)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 496 | 2.10 | (1) |
| Engineers | 193 | .82 | (1) |
| Industrial | 81 | .35 | 7.77 |
| Mechanical | 61 | .26 | 13.31 |
| Safety | 3 | .01 | 39.44 |
| Other, n.e.c | 48 | .20 | (1) |
| Scientists | 18 | .07 | (1) |
| Computer specialists | 18 | .07 | 13.26 |
| Technicians | 285 | 1.21 | (1) |
| Computer programmer | 29 | .12 | 10.17 |
| Drafter | 208 | .90 | 9.01 |
| Mechanical engineering technician | 7 | .03 | 29.62 |
| Industrial engineering technicians | 18 | .07 | 16.85 |
| All other engineering technicians | 23 | .09 | 18.49 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Partitions and office and store fixtures (SIC 2540)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 1,528 | 2.62 | (1) |
| Engineers | 382 | .65 | (1) |
| Industrial | 175 | .30 | 7.79 |
| Mechanical | 142 | .24 | 10.43 |
| Safety | 8 | .01 | 17.67 |
| Other, n.e.c | 57 | .10 | (1) |
| Scientists | 108 | .18 | (1) |
| Computer specialists | 108 | .18 | 14.27 |
| Technicians | 1,038 | 1.79 | (1) |
| Computer programmer | 93 | .16 | 7.75 |
| Drafter | 851 | 1.49 | 4.98 |
| Mechanical engineering technician | 16 | .02 | 24.92 |
| Industrial engineering technicians | 30 | .05 | 11.64 |
| All other engineering technicians | 48 | .07 | (1) |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Miscellaneous furniture and fixtures (SIC 2590)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 585 | 1.85 | (1) |
| Engineers | 183 | .57 | (1) |
| Industrial | 80 | .25 | 14.03 |
| Mechanical | 81 | .26 | 16.54 |
| Safety | 7 | .02 | 25.95 |
| Other, n.e.c | 15 | .04 | (1) |
| Scientists | 45 | .14 | (1) |
| Computer specialists | 45 | .14 | 14.90 |
| Technicians | 357 | 1.14 | (1) |
| Computer programmer | 62 | .20 | 11.93 |
| Drafter | 214 | .69 | 10.08 |
| Mechanical engineering technician | 25 | .08 | 34.05 |
| Industrial engineering technicians | 38 | .12 | 21.95 |
| All other engineering technicians | 18 | .05 | 25.03 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Pulp mills (SIC 2610)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 857 | 5.83 | (1) |
| Engineers | 298 | 2.03 | (1) |
| Chemical | 101 | .69 | 11.84 |
| Electrical/electronic | 29 | .20 | 13.57 |
| Industrial | 49 | .33 | 23.65 |
| Mechanical | 109 | .75 | 11.68 |
| Other, n.e.c | 10 | .06 | (1) |
| Scientists | 205 | 1.39 | (1) |
| Chemists | 124 | .85 | 20.80 |
| All other physical scientists | 23 | .15 | 22.04 |
| Life scientists | 13 | .08 | 29.89 |
| Computer specialists | 45 | .31 | 21.54 |
| Technicians | 354 | 2.41 | (1) |
| Computer programmer | 23 | .15 | 21.99 |
| Drafter | 32 | .22 | 14.25 |
| Electrical/electronic technicians | 12 | .08 | 35.35 |
| All other engineering technicians | 112 | .76 | (1) |
| Physical and life science technicians | 175 | 1.20 | (1) |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Paper mills, except building paper mills (SIC 2620)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 6,764 | 3.86 | (1) |
| Engineers | 3,053 | 1.75 | (1) |
| Chemical | 913 | .53 | 10.30 |
| Electrical/electronic | 436 | .25 | 8.21 |
| Industrial | 436 | .25 | 8.74 |
| Mechanical | 875 | .50 | 6.26 |
| Other, n.e.c | 393 | .22 | (1) |
| Scientists | 982 | .55 | (1) |
| Chemists | 502 | .29 | 15.45 |
| All other physical scientists | 106 | .06 | 16.84 |
| Life scientists | 49 | .02 | 41.85 |
| Computer specialists | 325 | .18 | 10.37 |
| Technicians | 2,729 | 1.56 | (1) |
| Computer programmer | 333 | .19 | 10.67 |
| Drafter | 298 | .17 | 7.21 |
| Electrical/electronic technicians | 266 | .15 | 32.45 |
| Mechanical engineering technician | 88 | .05 | 17.63 |
| Industrial engineering technicians | 91 | .05 | 44.26 |
| All other engineering technicians | 309 | .18 | 16.99 |
| Chemical technicians, except health | 1,197 | .69 | 12.68 |
| All other physical and life science technicians | 147 | .08 | 30.86 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Paperboard mills SIC 2630)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 2,003 | 3.34 | (1) |
| Engineers | 1,001 | 1.68 | (1) |
| Chemical | 277 | .47 | 10.07 |
| Electrical/electronic | 108 | .18 | 8.56 |
| Industrial | 179 | .30 | 18.20 |
| Mechanical | 320 | .54 | 6.84 |
| Other, n.e.c | 117 | .19 | (1) |
| Scientists | 257 | .43 | (1) |
| Chemists | 131 | .22 | 19.47 |
| All other physical scientists | 32 | .05 | 22.87 |
| Computer specialists | 94 | .16 | 16.79 |
| Technicians | 745 | 1.23 | (1) |
| Computer programmer | 88 | .15 | 13.97 |
| Drafter | 87 | .14 | 8.86 |
| Mechanical engineering technician | 18 | .03 | 38.32 |
| Industrial engineering technicians | 7 | .01 | 30.30 |
| All other engineering technicians | 107 | .17 | (1) |
| Chemical technicians, except health | 286 | .48 | 13.67 |
| All other physical and life science technicians | 152 | .25 | 38.72 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Converted paper and paperboard products (SIC 2640)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 7,902 | 3.67 | (1) |
| Engineers | 4,030 | 1.88 | (1) |
| Chemical | 478 | .22 | 19.45 |
| Industrial | 484 | .22 | 13.50 |
| Mechanical | 637 | .30 | 13.30 |
| Other, n.e.c | 2,431 | 1.14 | (1) |
| Scientists | 1,647 | .77 | (1) |
| Physical scientists | 1,154 | .54 | (1) |
| Computer specialists | 493 | .23 | 27.48 |
| Technicians | 2,225 | 1.02 | (1) |
| Computer programmer | 358 | .16 | 10.53 |
| Drafter | 382 | .18 | 31.02 |
| Electrical/electronic technicians | 283 | .13 | 24.22 |
| Mechanical engineering technician | 129 | .06 | 15.49 |
| Industrial engineering technicians | 83 | .03 | 12.20 |
| All other engineering technicians | 990 | .46 | 26.92 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Paperboard containers and boxes (SIC 2650)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 1,552 | 0.76 | (1) |
| Engineers | 700 | .35 | (1) |
| Chemical | 60 | .03 | 46.09 |
| Electrical/electronic | 29 | .01 | 19.56 |
| Industrial | 257 | .13 | 7.48 |
| Mechanical | 169 | .09 | 21.12 |
| Other, n.e.c. | 185 | .09 | (1) |
| Scientists | 261 | .13 | (1) |
| Chemists | 87 | .04 | 50.22 |
| All other physical scientists | 5 | (1) | 34.64 |
| Computer specialists | 169 | .09 | 28.14 |
| Technicians | 591 | .28 | (1) |
| Computer programmer | 171 | .09 | 16.04 |
| Drafter | 102 | .05 | 12.14 |
| Electrical/electronic technicians | 69 | .03 | 21.06 |
| Mechanical engineering technician | 43 | .02 | 30.03 |
| Industrial engineering technicians | 31 | .01 | 16.57 |
| All other engineering technicians | 66 | .03 | 31.65 |
| Physical and life science technicians | 109 | .05 | (1) |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Building paper and board mills (SIC 2660)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 274 | 2.56 | (1) |
| Engineers | 105 | .98 | (1) |
| Chemical | 43 | .40 | 59.20 |
| Electrical/electronic | 16 | .15 | 30.74 |
| Industrial | 16 | .15 | 22.00 |
| Mechanical | 20 | .19 | 17.74 |
| Other, n.e.c. | 10 | .09 | (1) |
| Scientists | 28 | .26 | (1) |
| Chemists | 18 | .17 | 22.29 |
| All other physical scientists | 10 | .09 | 33.76 |
| Technicians | 141 | 1.32 | (1) |
| Drafter | 16 | .15 | 24.84 |
| Electrical/electronic technicians | 10 | .09 | 44.83 |
| All other engineering technicians | 81 | .76 | (1) |
| Physical and life science technicians | 34 | .32 | (1) |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Newspapers (SIC 2710)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 2,964 | 0.66 | (1) |
| Engineers | 281 | .06 | (1) |
| Industrial | 47 | .01 | 21.67 |
| Mechanical | 176 | .04 | 21.51 |
| Other, n.e.c | 58 | .01 | (1) |
| Scientists | 933 | .21 | (1) |
| Statistician | 26 | (1) | 22.75 |
| Computer specialists | 907 | .21 | 7.16 |
| Technicians | 1,750 | .39 | (1) |
| Computer programmer | 1,227 | .28 | 5.61 |
| Drafter | 170 | .04 | 24.88 |
| Tool programmer, numerical controls | 9 | (1) | 30.83 |
| Industrial engineering technicians | 13 | (1) | 36.73 |
| All other engineering technicians | 331 | .07 | 13.83 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Periodicals (SIC 2720)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 2,085 | 2.06 | (1) |
| Engineers | 67 | .05 | (1) |
| Mechanical | 24 | .02 | 36.75 |
| Other, n.e.c | 43 | .03 | (1) |
| Scientists | 725 | .72 | (1) |
| Statistician | 113 | .11 | 34.08 |
| All other mathematicians | 57 | .05 | 45.07 |
| Computer specialists | 555 | .56 | 12.87 |
| Technicians | 1,293 | 1.29 | (1) |
| Computer programmer | 820 | .83 | 12.46 |
| Drafter | 267 | .27 | 28.50 |
| Tool programmer, numerical controls | 18 | .01 | 38.76 |
| Industrial engineering technicians | 8 | (1) | 37.08 |
| All other engineering technicians | 180 | .18 | 36.11 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Books (SIC 2730)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 1,768 | 1.74 | (1) |
| Engineers | 104 | .09 | (1) |
| Industrial | 73 | .07 | 17.35 |
| Mechanical | 22 | .02 | 22.45 |
| Other, n.e.c. | 9 | (1) | (1) |
| Scientists | 684 | .68 | (1) |
| Statistician | 36 | .03 | 32.39 |
| Computer specialists | 648 | .65 | 12.60 |
| Technicians | 980 | .97 | (1) |
| Computer programmer | 735 | .74 | 10.35 |
| Drafter | 203 | .20 | 23.51 |
| Tool programmer, numerical controls | 22 | .02 | 39.75 |
| Industrial engineering technicians | 9 | (1) | 32.39 |
| All other engineering technicians | 11 | .01 | 22.45 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Miscellaneous publishing (SIC 2740)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 1,650 | 3.10 | (1) |
| Engineers | 22 | .02 | (1) |
| Industrial | 13 | .02 | 26.31 |
| Other, n.e.c. | 9 | (1) | (1) |
| Scientists | 204 | .37 | (1) |
| Physical scientists | 14 | .02 | 47.00 |
| Computer specialists | 190 | .35 | 16.35 |
| Technicians | 1,424 | 2.64 | (1) |
| Computer programmer | 530 | .99 | 14.53 |
| Drafter | 868 | 1.62 | 13.31 |
| All other engineering technicians | 26 | .03 | (1) |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Commercial printing (SIC 2750)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 2,956 | 0.66 | (1) |
| Engineers | 434 | .08 | (1) |
| Industrial | 193 | .04 | 11.74 |
| Mechanical | 167 | .03 | 11.47 |
| Other, n.e.c | 74 | .01 | (1) |
| Scientists | 374 | .07 | (1) |
| Statistician | 17 | (1) | 30.45 |
| Physical scientists | 21 | (1) | 29.81 |
| Computer specialists | 336 | .07 | 9.70 |
| Technicians | 2,148 | .47 | (1) |
| Computer programmer | 780 | .17 | 9.57 |
| Drafter | 1,212 | .27 | 11.59 |
| Industrial engineering technicians | 64 | .01 | 24.63 |
| All other engineering technicians | 44 | .01 | 17.93 |
| Physical and life science technicians | 48 | .01 | 55.06 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Manifold business forms (SIC 2760)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 677 | 1.48 | (1) |
| Engineers | 186 | .38 | (1) |
| Industrial | 69 | .14 | 10.43 |
| Mechanical | 92 | .19 | 22.86 |
| Other, n.e.c | 25 | .05 | (1) |
| Scientists | 145 | .30 | (1) |
| Physical scientists | 13 | .02 | 33.35 |
| Computer specialists | 132 | .28 | 14.82 |
| Technicians | 346 | .71 | (1) |
| Computer programmer | 167 | .35 | 13.86 |
| Drafter | 98 | .20 | 19.44 |
| Industrial engineering technicians | 8 | .01 | 31.37 |
| All other engineering technicians | 73 | .15 | 35.29 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Greeting card publishing (SIC 2770)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 203 | 1.01 | (1) |
| Engineers | 67 | .28 | (1) |
| Industrial | 29 | .12 | 24.91 |
| Mechanical | 19 | .08 | 26.21 |
| Other, n.e.c. | 19 | .08 | (1) |
| Technicians | 136 | .57 | (1) |
| Computer programmer | 82 | .35 | 34.99 |
| Industrial engineering technicians | 27 | .11 | 28.20 |
| All other engineering technicians | 27 | .11 | (1) |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Blankbooks and bookbinding (SIC 2780)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 326 | 0.47 | (1) |
| Engineers | 87 | .12 | (1) |
| Industrial | 61 | .09 | 15.86 |
| Other, n.e.c. | 26 | .03 | (1) |
| Scientists | 58 | .09 | (1) |
| Computer specialists | 58 | .09 | 15.73 |
| Technicians | 181 | .26 | (1) |
| Computer programmer | 93 | .14 | 15.60 |
| Drafter | 68 | .10 | 18.02 |
| Industrial engineering technicians | 15 | .02 | 32.11 |
| All other engineering technicians | 5 | (1) | 37.94 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Printing trade services (SIC 2790)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 554 | 1.22 | (1) |
| Engineers | 14 | .02 | (1) |
| Field unspecified | 14 | .02 | (1) |
| Scientists | 107 | .24 | (1) |
| Computer specialists | 107 | .24 | 12.95 |
| Technicians | 433 | .96 | (1) |
| Computer programmer | 235 | .52 | 10.70 |
| Engineering technicians | 198 | .44 | (1) |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Industrial inorganic chemicals (SIC 2810)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 23,603 | 15.00 | (1) |
| Engineers | 8,801 | 5.59 | (1) |
| Chemical | 3,778 | 2.42 | 11.18 |
| Civil | 256 | .16 | 21.40 |
| Electrical/electronic | 840 | .53 | 20.02 |
| Industrial | 381 | .24 | 21.42 |
| Mechanical | 1,651 | 1.05 | 14.59 |
| Metallurgists/metallurgical | 271 | .17 | 21.05 |
| Safety | 446 | .28 | 15.46 |
| Other, n.e.c | 1,178 | .74 | (1) |
| Scientists | 4,716 | 2.98 | (1) |
| Operations and systems researchers and analysts | 147 | .09 | 28.07 |
| Statistician | 201 | .12 | 40.68 |
| Chemists | 2,747 | 1.76 | 10.59 |
| Physicists and astronomers | 69 | .04 | 35.30 |
| All other physical scientists | 158 | .10 | 19.00 |
| Agricultural scientists | 39 | .02 | 29.80 |
| Biological scientists | 273 | .17 | 22.18 |
| All other life scientists | 94 | .05 | (1) |
| Computer specialists | 988 | .63 | 22.92 |
| Technicians | 10,086 | 6.43 | (1) |
| Computer programmer | 548 | .35 | 12.93 |
| Drafter | 765 | .49 | 11.91 |
| Electrical/electronic technicians | 994 | .63 | 28.34 |
| Mechanical engineering technician | 361 | .23 | 31.19 |
| Tool programmer, numerical controls | 82 | .05 | 24.90 |
| Industrial engineering technicians | 320 | .20 | 33.59 |
| Civil engineering technician | 65 | .04 | 36.39 |
| All other engineering technicians | 1,366 | .87 | 19.54 |
| Chemical technicians, except health | 4,882 | 3.13 | 8.81 |
| All other physical and life science technicians | 703 | .44 | (1) |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Plastics and synthetic materials and manmade fibers (SIC 2820)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 24,695 | 13.79 | (1) |
| Engineers | 10,258 | 5.72 | (1) |
| Chemical | 4,394 | 2.47 | 7.21 |
| Civil | 371 | .20 | 28.84 |
| Electrical/electronic | 898 | .50 | 18.86 |
| Industrial | 419 | .23 | 8.49 |
| Mechanical | 2,236 | 1.25 | 14.03 |
| Safety | 239 | .13 | 6.83 |
| Other, n.e.c. | 1,701 | .94 | (1) |
| Scientists | 4,462 | 2.44 | (1) |
| Operations and systems researchers and analysts | 34 | .01 | 16.26 |
| Statistician | 49 | .02 | 17.62 |
| All other mathematicians | 16 | (1) | 27.52 |
| Chemists | 2,734 | 1.53 | 7.28 |
| Physicists and astronomers | 64 | .03 | 22.49 |
| All other physical scientists | 346 | .19 | 27.84 |
| Biological scientists | 51 | .02 | 20.83 |
| All other life scientists | 57 | .02 | (1) |
| Computer specialists | 1,111 | .62 | 23.48 |
| Technicians | 9,975 | 5.55 | (1) |
| Computer programmer | 585 | .32 | 17.99 |
| Drafter | 1,038 | .58 | 32.25 |
| Electrical/electronic technicians | 220 | .12 | 11.99 |
| Mechanical engineering technician | 226 | .12 | 23.80 |
| Industrial engineering technicians | 106 | .05 | 19.48 |
| Civil engineering technician | 30 | .01 | 27.52 |
| All other engineering technicians | 954 | .53 | 17.28 |
| Chemical technicians, except health | 6,504 | 3.66 | 7.57 |
| All other physical and life science technicians | 312 | .16 | (1) |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Drugs (SIC 2830)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 39,168 | 19.27 | (1) |
| Engineers | 4,473 | 2.17 | (1) |
| Chemical | 1,347 | .66 | 17.62 |
| Civil | 68 | .03 | 25.51 |
| Electrical/electronic | 259 | .12 | 14.63 |
| Industrial | 867 | .43 | 21.26 |
| Mechanical | 551 | .27 | 11.10 |
| Safety | 236 | .11 | 18.00 |
| Other, n.e.c | 1,145 | .55 | (1) |
| Scientists | 21,654 | 10.69 | (1) |
| Operations and systems researchers and analysts | 132 | .06 | 22.58 |
| Statistician | 453 | .22 | 15.42 |
| Chemists | 9,130 | 4.52 | 8.64 |
| Physicists and astronomers | 17 | (1) | 31.18 |
| All other physical scientists | 491 | .24 | 25.78 |
| Agricultural scientists | 157 | .07 | 30.02 |
| Biological scientists | 6,112 | 3.03 | 11.79 |
| Medical scientists | 1,919 | .95 | 20.82 |
| All other life scientists | 974 | .48 | 22.15 |
| Computer specialists | 2,269 | 1.12 | 15.09 |
| Technicians | 13,041 | 6.41 | (1) |
| Computer programmer | 1,215 | .60 | 12.39 |
| Drafter | 286 | .14 | 11.86 |
| Electrical/electronic technicians | 197 | .09 | 21.47 |
| Mechanical engineering technician | 70 | .03 | 35.45 |
| Tool programmer, numerical controls | 8 | (1) | 36.22 |
| Industrial engineering technicians | 162 | .08 | 24.16 |
| Civil engineering technician | 32 | .01 | 43.16 |
| All other engineering technicians | 167 | .08 | 21.27 |
| Biological science technicians | 3,162 | 1.56 | 14.84 |
| Chemical technicians, except health | 6,612 | 3.27 | 11.60 |
| All other physical and life science technicians | 1,123 | .55 | 15.20 |
| Mathematical technician | 7 | (1) | 39.38 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Soap, detergents, cosmetics, and toilet goods (SIC 2840)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 10,730 | 7.32 | (1) |
| Engineers | 2,522 | 1.72 | (1) |
| Chemical | 474 | .32 | 11.96 |
| Civil | 47 | .03 | 32.33 |
| Electrical/electronic | 102 | .07 | 17.88 |
| Industrial | 274 | .19 | 10.78 |
| Mechanical | 477 | .33 | 12.11 |
| Safety | 62 | .04 | 14.29 |
| Other, n.e.c. | 1,086 | .74 | (1) |
| Scientists | 3,913 | 2.68 | (1) |
| Operations and systems researchers and analysts | 49 | .03 | 24.05 |
| Statistician | 35 | .02 | 29.58 |
| Chemists | 2,723 | 1.89 | 8.18 |
| All other physical scientists | 73 | .04 | (1) |
| Agricultural scientists | 44 | .03 | 51.27 |
| Biological scientists | 352 | .24 | 17.30 |
| Medical scientists | 38 | .02 | 41.38 |
| All other life scientists | 72 | .05 | 39.78 |
| Computer specialists | 527 | .36 | 21.58 |
| Technicians | 4,295 | 2.92 | (1) |
| Computer programmer | 523 | .36 | 11.36 |
| Drafter | 135 | .09 | 15.35 |
| Mechanical engineering technician | 10 | (1) | 39.37 |
| Tool programmer, numerical controls | 12 | (1) | 41.83 |
| Industrial engineering technicians | 82 | .05 | 22.22 |
| Civil engineering technician | 6 | (1) | 47.14 |
| All other engineering technicians | 207 | .14 | (1) |
| Biological science technicians | 341 | .23 | 30.00 |
| Chemical technicians, except health | 2,873 | 1.99 | 9.37 |
| All other physical and life science technicians | 99 | .06 | 27.76 |
| Mathematical technician | 7 | (1) | 50.70 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Paints and allied products (SIC 2850)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 7,087 | 11.61 | (1) |
| Engineers | 1,125 | 1.81 | (1) |
| Chemical | 313 | .51 | 16.54 |
| Electrical/electronic | 6 | (1) | 44.40 |
| Industrial | 167 | .27 | 39.21 |
| Mechanical | 91 | .15 | 16.47 |
| Safety | 42 | .06 | 11.41 |
| Other, n.e.c. | 506 | .82 | (1) |
| Scientists | 3,050 | 5.02 | (1) |
| Operations and systems researchers and analysts | 20 | .03 | 25.44 |
| Physical scientists | 2,930 | 4.84 | (1) |
| Life scientists | 19 | .02 | (1) |
| Computer specialists | 81 | .13 | 13.65 |
| Technicians | 2,912 | 4.78 | (1) |
| Computer programmer | 98 | .16 | 12.90 |
| Drafter | 4 | (1) | 46.09 |
| All other engineering technicians | 95 | .13 | (1) |
| Chemical technicians, except health | 2,659 | 4.40 | 6.75 |
| All other physical and life science technicians | 56 | .09 | (1) |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Industrial organic chemicals (SIC 2860)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 34,645 | 21.19 | (1) |
| Engineers | 11,841 | 7.21 | (1) |
| Chemical | 5,277 | 3.23 | 9.09 |
| Civil | 714 | .43 | 24.45 |
| Electrical/electronic | 1,058 | .64 | 16.42 |
| Industrial | 915 | .56 | 24.88 |
| Mechanical | 2,307 | 1.41 | 13.56 |
| Metallurgists/metallurgical | 93 | .05 | 16.98 |
| Safety | 353 | .21 | 10.53 |
| Other, n.e.c | 1,124 | .68 | (1) |
| Scientists | 8,940 | 5.42 | (1) |
| Operations and systems researchers and analysts | 411 | .25 | 21.45 |
| Statistician | 45 | .02 | 26.89 |
| Chemists | 6,287 | 3.85 | 11.58 |
| Physicists and astronomers | 78 | .04 | 31.36 |
| All other physical scientists | 220 | .13 | 14.26 |
| Biological scientists | 674 | .41 | 22.70 |
| All other life scientists | 369 | .20 | (1) |
| Computer specialists | 856 | .52 | 11.08 |
| Technicians | 13,864 | 8.47 | (1) |
| Computer programmer | 836 | .51 | 13.47 |
| Drafter | 850 | .52 | 13.35 |
| Electrical/electronic technicians | 752 | .46 | 17.68 |
| Mechanical engineering technician | 602 | .36 | 23.09 |
| Industrial engineering technicians | 425 | .26 | 38.50 |
| Civil engineering technician | 155 | .09 | 19.65 |
| All other engineering technicians | 629 | .38 | 26.05 |
| Biological science technicians | 220 | .13 | 18.69 |
| Chemical technicians, except health | 9,085 | 5.57 | 12.15 |
| All other physical and life science technicians | 310 | .19 | 17.03 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Agricultural chemicals (SIC 2870)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 5,360 | 8.58 | (1) |
| Engineers | 2,033 | 3.26 | (1) |
| Agricultural | 22 | .03 | 28.45 |
| Chemical | 911 | 1.48 | 11.13 |
| Civil | 72 | .11 | 24.59 |
| Electrical/electronic | 100 | .16 | 11.93 |
| Industrial | 174 | .28 | 21.29 |
| Mechanical | 415 | .67 | 9.61 |
| Metallurgists/metallurgical | 51 | .08 | 26.04 |
| Safety | 72 | .11 | 8.24 |
| Other, n.e.c | 216 | .34 | (1) |
| Scientists | 1,268 | 2.03 | (1) |
| Operations and systems researchers and analysts | 17 | .02 | 26.95 |
| Chemists | 960 | 1.56 | 11.19 |
| All other physical scientists | 54 | .08 | (1) |
| Biological scientists | 88 | .14 | 23.89 |
| All other life scientists | 52 | .08 | (1) |
| Computer specialists | 97 | .15 | 12.60 |
| Technicians | 2,059 | 3.29 | (1) |
| Computer programmer | 129 | .20 | 13.02 |
| Drafter | 141 | .22 | 8.47 |
| Electrical/electronic technicians | 57 | .09 | 24.06 |
| Mechanical engineering technician | 21 | .03 | 22.23 |
| Civil engineering technician | 12 | .01 | 31.40 |
| All other engineering technicians | 115 | .18 | (1) |
| Biological science technicians | 136 | .22 | 22.76 |
| Chemical technicians, except health | 1,344 | 2.18 | 7.41 |
| All other physical and life science technicians | 104 | .16 | 28.66 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Miscellaneous chemical products (SIC 2890)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 11,599 | 12.89 | (1) |
| Engineers | 3,623 | 3.99 | (1) |
| Chemical | 1,170 | 1.30 | 8.48 |
| Civil | 40 | .04 | 33.96 |
| Electrical/electronic | 252 | .28 | 39.51 |
| Industrial | 168 | .18 | 17.55 |
| Mechanical | 563 | .62 | 8.95 |
| Metallurgists/metallurgical | 49 | .05 | 43.04 |
| Safety | 85 | .09 | 16.42 |
| Other, n.e.c | 1,296 | 1.43 | (1) |
| Scientists | 3,017 | 3.36 | (1) |
| Operations and systems researchers and analysts | 29 | .03 | 20.80 |
| Chemists | 2,641 | 2.95 | 5.66 |
| All other physical scientists | 30 | .03 | (1) |
| Life scientists | 83 | .09 | (1) |
| Computer specialists | 234 | .26 | 11.86 |
| Technicians | 4,959 | 5.49 | (1) |
| Computer programmer | 241 | .26 | 9.29 |
| Drafter | 250 | .27 | 12.64 |
| Electrical/electronic technicians | 217 | .24 | 30.74 |
| Mechanical engineering technician | 77 | .08 | 21.39 |
| Industrial engineering technicians | 38 | .04 | 35.31 |
| Civil engineering technician | 21 | .02 | 33.09 |
| All other engineering technicians | 206 | .23 | 18.82 |
| Biological science technicians | 71 | .07 | 30.03 |
| Chemical technicians, except health | 3,676 | 4.10 | 5.00 |
| All other physical and life science technicians | 162 | .18 | 27.19 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Petroleum refining (SIC 2910)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 25,050 | 15.57 | (1) |
| Engineers | 10,457 | 6.52 | (1) |
| Chemical | 4,501 | 2.82 | 9.54 |
| Civil | 536 | .33 | 13.28 |
| Electrical/electronic | 843 | .52 | 12.97 |
| Industrial | 789 | .49 | 23.32 |
| Mechanical | 2,378 | 1.49 | 8.71 |
| Petroleum | 378 | .23 | 21.39 |
| Safety | 399 | .25 | 9.13 |
| Other, n.e.c | 633 | .39 | (1) |
| Scientists | 4,798 | 2.97 | (1) |
| Statistician | 34 | .02 | 30.18 |
| All other mathematicians | 92 | .05 | 31.33 |
| Chemists | 2,023 | 1.26 | 12.15 |
| Geologists, geophysicists, and earth scientists | 782 | .49 | 26.06 |
| All other physical scientists | 93 | .05 | 16.57 |
| Life scientists | 29 | .01 | 31.50 |
| Computer specialists | 1,745 | 1.09 | 19.50 |
| Technicians | 9,795 | 6.08 | (1) |
| Computer programmer | 1,365 | .85 | 21.71 |
| Drafter | 939 | .58 | 11.02 |
| Electrical/electronic technicians | 432 | .27 | 16.24 |
| Mechanical engineering technician | 427 | .26 | 19.50 |
| Industrial engineering technicians | 210 | .13 | 28.52 |
| Civil engineering technician | 159 | .09 | 26.42 |
| All other engineering technicians | 600 | .37 | 24.91 |
| Chemical technicians, except health | 4,463 | 2.79 | 11.28 |
| Petroleum technicians | 678 | .42 | 20.69 |
| All other physical and life science technicians | 490 | .30 | 43.38 |
| Mathematical technician | 32 | .02 | 33.21 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Paving and roofing materials (SIC 2950)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 637 | 2.32 | (1) |
| Engineers | 113 | .40 | (1) |
| Chemical | 10 | .03 | 26.26 |
| Civil | 23 | .08 | 30.37 |
| Industrial | 25 | .09 | 18.54 |
| Mechanical | 35 | .13 | 14.62 |
| Safety | 6 | .02 | 33.74 |
| Other, n.e.c | 14 | .05 | (1) |
| Scientists | 146 | .55 | (1) |
| Chemists | 146 | .55 | 11.37 |
| Technicians | 378 | 1.37 | (1) |
| Computer programmer | 34 | .12 | 38.48 |
| Drafter | 11 | .04 | 25.38 |
| All other engineering technicians | 31 | .09 | (1) |
| Chemical technicians, except health | 259 | .97 | 9.80 |
| Petroleum technicians | 28 | .10 | 30.15 |
| All other physical and life science technicians | 15 | .05 | 36.81 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Miscellaneous petroleum and coal products (SIC 2990)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 706 | 6.29 | (1) |
| Engineers | 54 | .45 | (1) |
| Chemical | 22 | .19 | 23.53 |
| Industrial | 9 | .08 | 21.94 |
| Mechanical | 12 | .10 | 22.97 |
| Safety | 3 | .02 | 38.00 |
| Other, n.e.c | 8 | .06 | (1) |
| Scientists | 335 | 3.00 | (1) |
| Physical scientists | 330 | 2.96 | (1) |
| Computer specialists | 5 | .04 | 30.33 |
| Technicians | 317 | 2.84 | (1) |
| Computer programmer | 16 | .14 | 19.66 |
| Chemical technicians, except health | 246 | 2.21 | 8.62 |
| Petroleum technicians | 55 | .49 | 17.47 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Tires and inner tubes (SIC 3010)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 7,515 | 7.78 | (1) |
| Engineers | 4,190 | 4.36 | (1) |
| Chemical | 1,027 | 1.07 | 44.13 |
| Electrical/electronic | 519 | .54 | 35.97 |
| Industrial | 537 | .56 | 21.90 |
| Mechanical | 1,649 | 1.72 | 35.11 |
| Safety | 227 | .23 | 47.32 |
| Other, n.e.c. | 231 | .24 | (1) |
| Scientists | 915 | .94 | (1) |
| Physical scientists | 437 | .45 | (1) |
| Computer specialists | 478 | .49 | 28.46 |
| Technicians | 2,410 | 2.48 | (1) |
| Computer programmer | 468 | .48 | 40.22 |
| Drafter | 177 | .18 | 34.65 |
| Electrical/electronic technicians | 240 | .25 | 27.02 |
| Mechanical engineering technician | 383 | .40 | 32.80 |
| Industrial engineering technicians | 132 | .13 | 24.17 |
| All other engineering technicians | 408 | .42 | 22.64 |
| Chemical technicians, except health | 527 | .55 | 16.35 |
| All other physical and life science technicians | 75 | .07 | 50.16 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Rubber and plastics footwear (SIC 3020)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 140 | 0.74 | (1) |
| Engineers | 43 | .22 | (1) |
| Industrial | 20 | .11 | 23.29 |
| Mechanical | 11 | .06 | 26.65 |
| Other, n.e.c. | 12 | .05 | (1) |
| Scientists | 18 | .09 | (1) |
| Chemists | 8 | .04 | 30.36 |
| Computer specialists | 10 | .05 | 31.14 |
| Technicians | 79 | .43 | (1) |
| Computer programmer | 43 | .24 | 24.24 |
| Engineering technicians | 30 | .16 | (1) |
| Chemical technicians, except health | 6 | .03 | 49.72 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Reclaimed rubber (SIC 3030)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 23 | 2.55 | (1) |
| Engineers | 6 | .66 | (1) |
| Field unspecified | 6 | .66 | (1) |
| Technicians | 17 | 1.89 | (1) |
| Chemical technicians, except health | 17 | 1.89 | 9.66 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Rubber and plastics hose and belting (SIC 3040)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 862 | 4.48 | (1) |
| Engineers | 416 | 2.17 | (1) |
| Electrical/electronic | 46 | .24 | 25.89 |
| Industrial | 97 | .51 | 13.70 |
| Mechanical | 122 | .64 | 14.89 |
| Other, n.e.c | 151 | .78 | (1) |
| Scientists | 59 | .30 | (1) |
| Chemists | 35 | .18 | 15.51 |
| Computer specialists | 24 | .12 | 16.19 |
| Technicians | 387 | 2.01 | (1) |
| Computer programmer | 29 | .15 | 18.76 |
| Drafter | 42 | .22 | 14.22 |
| Electrical/electronic technicians | 12 | .06 | 25.41 |
| Mechanical engineering technician | 18 | .09 | 30.27 |
| Industrial engineering technicians | 19 | .10 | 17.29 |
| All other engineering technicians | 117 | .61 | 31.41 |
| Chemical technicians, except health | 53 | .27 | 14.48 |
| All other physical and life science technicians | 97 | .51 | 28.40 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Fabricated rubber products, n.e.c. (SIC 3060)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 4,187 | 4.11 | (1) |
| Engineers | 1,577 | 1.55 | (1) |
| Chemical | 327 | .32 | 8.34 |
| Electrical/electronic | 64 | .06 | 19.94 |
| Industrial | 323 | .32 | 6.36 |
| Mechanical | 522 | .52 | 15.84 |
| Safety | 31 | .03 | 16.60 |
| Other, n.e.c. | 310 | .30 | (1) |
| Scientists | 443 | .44 | (1) |
| Chemists | 320 | .32 | 7.77 |
| All other physical scientists | 21 | .02 | 34.00 |
| Computer specialists | 102 | .10 | 11.53 |
| Technicians | 2,167 | 2.12 | (1) |
| Computer programmer | 183 | .18 | 11.11 |
| Drafter | 265 | .26 | 8.23 |
| Electrical/electronic technicians | 59 | .05 | 19.09 |
| Mechanical engineering technician | 217 | .21 | 30.18 |
| Industrial engineering technicians | 196 | .19 | 12.64 |
| All other engineering technicians | 229 | .22 | 12.91 |
| Chemical technicians, except health | 923 | .92 | 7.55 |
| All other physical and life science technicians | 95 | .09 | 24.37 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Miscellaneous plastics products (SIC 3070)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 11,571 | 2.27 | (1) |
| Engineers | 5,727 | 1.14 | (1) |
| Chemical | 1,205 | .24 | 7.47 |
| Electrical/electronic | 339 | .06 | 9.35 |
| Industrial | 1,062 | .21 | 6.34 |
| Mechanical | 1,709 | .35 | 4.73 |
| Safety | 125 | .02 | 11.39 |
| Other, n.e.c | 1,287 | .26 | (1) |
| Scientists | 879 | .15 | (1) |
| Chemists | 432 | .08 | 12.26 |
| All other physical scientists | 44 | (1) | 32.11 |
| Life scientists | 17 | (1) | 34.75 |
| Computer specialists | 386 | .07 | 8.33 |
| Technicians | 4,965 | .98 | (1) |
| Computer programmer | 673 | .13 | 7.46 |
| Drafter | 998 | .20 | 6.18 |
| Electrical/electronic technicians | 256 | .05 | 11.81 |
| Mechanical engineering technician | 477 | .09 | 9.26 |
| Industrial engineering technicians | 183 | .03 | 14.73 |
| All other engineering technicians | 634 | .13 | 12.26 |
| Chemical technicians, except health | 1,610 | .33 | 8.34 |
| All other physical and life science technicians | 134 | .02 | 20.16 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Leather tanning and finishing (SIC 3110)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 127 | 0.72 | (1) |
| Engineers | 55 | .27 | (1) |
| Chemical | 12 | .06 | 25.54 |
| Industrial | 22 | .11 | 15.34 |
| Mechanical | 10 | .05 | 26.83 |
| Safety | 3 | .01 | 69.92 |
| Other, n.e.c | 8 | .04 | (1) |
| Scientists | 34 | .17 | (1) |
| Chemists | 29 | .15 | 20.04 |
| All other physical scientists | 5 | .02 | 36.87 |
| Technicians | 38 | .19 | (1) |
| Physical and life science technicians | 38 | .19 | (1) |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Boot and shoe cut stock and findings (SIC 3130)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 53 | 0.60 | (1) |
| Engineers | 14 | .14 | (1) |
| Field unspecified | 14 | .14 | (1) |
| Scientists | 18 | .18 | (1) |
| Physical scientists | 18 | .18 | (1) |
| Technicians | 21 | .21 | (1) |
| Computer programmer | 7 | .07 | 24.32 |
| Chemical technicians, except health | 14 | .14 | 34.03 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Footwear, except rubber (SIC 3140)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 929 | 0.73 | (1) |
| Engineers | 367 | .26 | (1) |
| Industrial | 220 | .17 | 12.01 |
| Mechanical | 32 | .02 | 21.17 |
| Safety | 20 | .01 | 20.37 |
| Other, n.e.c. | 95 | .06 | (1) |
| Scientists | 152 | .11 | (1) |
| Computer specialists | 152 | .11 | 22.54 |
| Technicians | 410 | .29 | (1) |
| Computer programmer | 228 | .17 | 15.81 |
| Drafter | 16 | .01 | 33.48 |
| Mechanical engineering technician | 10 | (1) | 38.07 |
| Industrial engineering technicians | 99 | .07 | 15.24 |
| All other engineering technicians | 51 | .04 | 40.88 |
| Chemical technicians, except health | 6 | (1) | 38.72 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Luggage (SIC 3160)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 145 | 1.10 | (1) |
| Engineers | 65 | .50 | (1) |
| Field unspecified | 65 | .50 | (1) |
| Scientists | 20 | .16 | (1) |
| Computer specialists | 20 | .16 | 15.73 |
| Technicians | 60 | .44 | (1) |
| Computer programmer | 21 | .16 | 15.43 |
| Drafter | 6 | .04 | 25.81 |
| All other engineering technicians | 33 | .24 | (1) |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Handbags and personal leather goods (SIC 3170)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 91 | 0.37 | (1) |
| Engineers | 29 | .10 | (1) |
| Mechanical | 14 | .05 | 37.45 |
| Other, n.e.c. | 15 | .05 | (1) |
| Scientists | 11 | .04 | (1) |
| Computer specialists | 11 | .04 | 25.87 |
| Technicians | 51 | .18 | (1) |
| Computer programmer | 22 | .08 | 19.49 |
| Engineering technicians | 29 | .10 | (1) |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Leather goods, n.e.c. (SIC 3190)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 15 | 0.26 | (1) |
| Engineers | 6 | .06 | (1) |
| Field unspecified | 6 | .06 | (1) |
| Technicians | 9 | .09 | (1) |
| Engineering technicians | 9 | .09 | (1) |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Flat glass (SIC 3210)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 661 | 4.53 | (1) |
| Engineers | 390 | 2.52 | (1) |
| Electrical/electronic | 39 | .25 | 8.10 |
| Industrial | 166 | 1.08 | 17.72 |
| Mechanical | 71 | .46 | 8.53 |
| Metallurgists/metallurgical | 31 | .20 | 11.49 |
| Other, n.e.c | 83 | .53 | (1) |
| Scientists | 17 | .11 | (1) |
| Chemists | 17 | .11 | 12.88 |
| Technicians | 254 | 1.61 | (1) |
| Computer programmer | 54 | .35 | 7.72 |
| Drafter | 12 | .07 | 13.17 |
| Electrical/electronic technicians | 65 | .42 | 15.86 |
| Mechanical engineering technician | 8 | .05 | 24.36 |
| Industrial engineering technicians | 6 | .03 | 31.18 |
| All other engineering technicians | 63 | .40 | (1) |
| Physical and life science technicians | 46 | .29 | (1) |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Glass and glassware, pressed or blown (SIC 3220)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 3,088 | 2.88 | (1) |
| Engineers | 1,491 | 1.40 | (1) |
| Chemical | 74 | .07 | 27.97 |
| Civil | 23 | .02 | 16.72 |
| Electrical/electronic | 140 | .13 | 18.42 |
| Industrial | 340 | .32 | 27.77 |
| Mechanical | 432 | .41 | 27.48 |
| Metallurgists/metallurgical | 82 | .07 | 15.44 |
| Other, n.e.c. | 400 | .38 | (1) |
| Scientists | 158 | .15 | (1) |
| Computer specialists | 158 | .15 | 36.17 |
| Technicians | 1,439 | 1.33 | (1) |
| Computer programmer | 92 | .08 | 11.38 |
| Drafter | 245 | .23 | 18.65 |
| Electrical/electronic technicians | 141 | .13 | 26.41 |
| Mechanical engineering technician | 113 | .10 | 19.96 |
| Tool programmer, numerical controls | 23 | .02 | 24.74 |
| Industrial engineering technicians | 139 | .13 | 22.06 |
| All other engineering technicians | 271 | .25 | (1) |
| Physical and life science technicians | 415 | .39 | (1) |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Products of purchased glass (SIC 3230)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 1,380 | 3.03 | (1) |
| Engineers | 583 | 1.25 | (1) |
| Chemical | 85 | .18 | 40.86 |
| Electrical/electronic | 109 | .24 | 29.16 |
| Industrial | 71 | .15 | 13.45 |
| Mechanical | 217 | .48 | 22.24 |
| Metallurgists/metallurgical | 17 | .03 | 43.62 |
| Other, n.e.c. | 84 | .17 | (1) |
| Scientists | 265 | .58 | (1) |
| Physical scientists | 49 | .10 | (1) |
| Computer specialists | 216 | .48 | 54.59 |
| Technicians | 532 | 1.13 | (1) |
| Computer programmer | 204 | .45 | 34.31 |
| Drafter | 106 | .23 | 24.25 |
| Electrical/electronic technicians | 4 | (1) | 53.03 |
| Mechanical engineering technician | 53 | .11 | 29.34 |
| Industrial engineering technicians | 23 | .05 | 27.11 |
| All other engineering technicians | 104 | .22 | (1) |
| Physical and life science technicians | 38 | .07 | (1) |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Cement, hydraulic (SIC 3240)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 1,595 | 6.12 | (1) |
| Engineers | 377 | 1.43 | (1) |
| Chemical | 66 | .25 | 11.07 |
| Civil | 52 | .20 | 11.01 |
| Electrical/electronic | 68 | .26 | 8.33 |
| Industrial | 50 | .19 | 12.09 |
| Mechanical | 91 | .35 | 7.46 |
| Metallurgists/metallurgical | 16 | .06 | 29.04 |
| Other, n.e.c. | 34 | .12 | (1) |
| Scientists | 407 | 1.56 | (1) |
| Chemists | 314 | 1.21 | 6.73 |
| All other physical scientists | 21 | .08 | 29.35 |
| Computer specialists | 72 | .27 | 17.39 |
| Technicians | 811 | 3.09 | (1) |
| Computer programmer | 40 | .15 | 15.39 |
| Drafter | 69 | .26 | 10.77 |
| Electrical/electronic technicians | 58 | .22 | 16.28 |
| Mechanical engineering technician | 9 | .03 | 25.09 |
| Civil engineering technician | 18 | .06 | 18.42 |
| All other engineering technicians | 11 | .04 | (1) |
| Chemical technicians, except health | 525 | 2.02 | 6.64 |
| All other physical and life science technicians | 81 | .31 | 18.82 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Structural clay products (SIC 3250)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 351 | 0.89 | (1) |
| Engineers | 145 | .36 | (1) |
| Electrical/electronic | 6 | .01 | 39.44 |
| Industrial | 18 | .05 | 22.42 |
| Mechanical | 26 | .07 | 23.52 |
| Metallurgists/metallurgical | 56 | .15 | 13.87 |
| Other, n.e.c. | 39 | .08 | (1) |
| Scientists | 12 | .02 | (1) |
| Chemists | 5 | .01 | 44.27 |
| Computer specialists | 7 | .01 | 30.63 |
| Technicians | 194 | .51 | (1) |
| Computer programmer | 25 | .07 | 15.38 |
| Drafter | 28 | .07 | 18.99 |
| Electrical/electronic technicians | 11 | .03 | 26.19 |
| All other engineering technicians | 56 | .14 | (1) |
| Physical and life science technicians | 74 | .20 | (1) |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Pottery and related products (SIC 3260)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 980 | 2.50 | (1) |
| Engineers | 500 | 1.25 | (1) |
| Chemical | 10 | .02 | 36.19 |
| Electrical/electronic | 19 | .04 | 22.20 |
| Industrial | 76 | .19 | 12.28 |
| Mechanical | 102 | .26 | 11.16 |
| Metallurgists/metallurgical | 154 | .39 | 12.39 |
| Other, n.e.c. | 139 | .35 | (1) |
| Scientists | 41 | .09 | (1) |
| Chemists | 10 | .02 | 29.32 |
| All other physical scientists | 5 | .01 | 40.98 |
| Computer specialists | 26 | .06 | 19.68 |
| Technicians | 439 | 1.11 | (1) |
| Computer programmer | 64 | .16 | 26.60 |
| Drafter | 76 | .19 | 12.89 |
| Electrical/electronic technicians | 22 | .05 | 32.46 |
| Mechanical engineering technician | 55 | .14 | 21.35 |
| Industrial engineering technicians | 43 | .11 | 14.22 |
| All other engineering technicians | 132 | .34 | (1) |
| Chemical technicians, except health | 47 | .12 | 30.31 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Concrete, gypsum, and plaster products (SIC 3270)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 2,695 | 1.36 | (1) |
| Engineers | 815 | .40 | (1) |
| Chemical | 94 | .05 | 42.94 |
| Civil | 285 | .15 | 10.94 |
| Electrical/electronic | 138 | .07 | 14.58 |
| Industrial | 73 | .03 | 15.83 |
| Mechanical | 99 | .05 | 16.30 |
| Metallurgists/metallurgical | 15 | (1) | 24.49 |
| Other, n.e.c | 111 | .05 | (1) |
| Scientists | 232 | .11 | (1) |
| Physical scientists | 205 | .10 | (1) |
| Computer specialists | 27 | .01 | 22.34 |
| Technicians | 1,648 | .84 | (1) |
| Computer programmer | 76 | .04 | 14.85 |
| Drafter | 1,100 | .59 | 6.33 |
| Electrical/electronic technicians | 165 | .08 | 14.94 |
| Industrial engineering technicians | 15 | (1) | 36.57 |
| Civil engineering technician | 37 | .01 | 27.94 |
| All other engineering technicians | 36 | .01 | (1) |
| Chemical technicians, except health | 199 | .10 | 14.01 |
| All other physical and life science technicians | 20 | .01 | 39.84 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Cut stone and stone products (SIC 3280)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 314 | 2.97 | (1) |
| Engineers | 45 | .40 | (1) |
| Industrial | 31 | .28 | 25.19 |
| Mechanical | 14 | .12 | 20.57 |
| Technicians | 269 | 2.49 | (1) |
| Drafter | 269 | 2.49 | 8.35 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Miscellaneous nonmetallic mineral products (SIC 3290)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 5,984 | 5.31 | (1) |
| Engineers | 3,076 | 2.74 | (1) |
| Chemical | 371 | .33 | 23.32 |
| Civil | 93 | .08 | 32.45 |
| Electrical/electronic | 218 | .19 | 23.57 |
| Industrial | 610 | .55 | 5.32 |
| Mechanical | 892 | .80 | 7.66 |
| Metallurgists/metallurgical | 196 | .17 | 12.87 |
| Other, n.e.c | 696 | .62 | (1) |
| Scientists | 723 | .64 | (1) |
| Chemists | 232 | .20 | 8.89 |
| All other physical scientists | 13 | .01 | 28.26 |
| Computer specialists | 478 | .43 | 22.44 |
| Technicians | 2,185 | 1.93 | (1) |
| Computer programmer | 336 | .30 | 13.25 |
| Drafter | 445 | .40 | 6.99 |
| Electrical/electronic technicians | 57 | .05 | 18.25 |
| Mechanical engineering technician | 271 | .24 | 16.42 |
| Tool programmer, numerical controls | 33 | .02 | 17.87 |
| Industrial engineering technicians | 126 | .11 | 10.91 |
| Civil engineering technician | 6 | (1) | 29.81 |
| All other engineering technicians | 267 | .24 | 14.54 |
| Chemical technicians, except health | 593 | .53 | 9.29 |
| All other physical and life science technicians | 51 | .04 | 21.25 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Blast furnaces and basic steel products (SIC 3310)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 14,850 | 4.22 | (1) |
| Engineers | 6,959 | 1.99 | (1) |
| Chemical | 104 | .03 | 17.43 |
| Civil | 258 | .07 | 19.56 |
| Electrical/electronic | 684 | .19 | 12.20 |
| Industrial | 1,206 | .35 | 11.88 |
| Mechanical | 1,282 | .37 | 9.93 |
| Metallurgists/metallurgical | 1,934 | .56 | 16.48 |
| Mining | 36 | .01 | 41.73 |
| Safety | 311 | .09 | 16.19 |
| Other, n.e.c | 1,144 | .32 | (1) |
| Scientists | 1,870 | .52 | (1) |
| Operations and systems researchers and analysts | 244 | .07 | 32.56 |
| Chemists | 511 | .14 | 12.85 |
| All other physical scientists | 123 | .03 | 33.09 |
| Computer specialists | 992 | .28 | 13.32 |
| Technicians | 6,021 | 1.71 | (1) |
| Computer programmer | 865 | .25 | 20.00 |
| Drafter | 984 | .28 | 10.70 |
| Electrical/electronic technicians | 402 | .11 | 17.53 |
| Mechanical engineering technician | 212 | .06 | 20.25 |
| Tool programmer, numerical controls | 96 | .02 | 29.66 |
| Industrial engineering technicians | 462 | .13 | 19.46 |
| Civil engineering technician | 131 | .03 | 52.50 |
| All other engineering technicians | 1,454 | .42 | 13.64 |
| Chemical technicians, except health | 1,171 | .34 | 15.04 |
| All other physical and life science technicians | 244 | .07 | 39.33 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Iron and steel foundries (SIC 3320)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 5,028 | 3.54 | (1) |
| Engineers | 2,755 | 1.95 | (1) |
| Chemical | 13 | (1) | 34.22 |
| Civil | 58 | .04 | 12.69 |
| Electrical/electronic | 102 | .07 | 12.98 |
| Industrial | 666 | .48 | 9.67 |
| Mechanical | 559 | .40 | 10.14 |
| Metallurgists/metallurgical | 420 | .30 | 5.66 |
| Safety | 92 | .06 | 10.08 |
| Other, n.e.c | 845 | .60 | (1) |
| Scientists | 313 | .21 | (1) |
| Operations and systems researchers and analysts | 11 | (1) | 27.12 |
| Chemists | 133 | .09 | 11.70 |
| All other physical scientists | 16 | .01 | 18.75 |
| Computer specialists | 153 | .11 | 9.68 |
| Technicians | 1,960 | 1.38 | (1) |
| Computer programmer | 188 | .13 | 7.21 |
| Drafter | 430 | .31 | 9.88 |
| Electrical/electronic technicians | 45 | .03 | 13.71 |
| Mechanical engineering technician | 118 | .08 | 16.82 |
| Tool programmer, numerical controls | 33 | .02 | 17.66 |
| Industrial engineering technicians | 212 | .15 | 10.71 |
| Civil engineering technician | 9 | (1) | 33.70 |
| All other engineering technicians | 738 | .53 | 14.02 |
| Chemical technicians, except health | 138 | .10 | 14.42 |
| All other physical and life science technicians | 49 | .03 | 22.43 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Primary nonferrous metals (SIC 3330)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 3,447 | 6.91 | (1) |
| Engineers | 1,295 | 2.60 | (1) |
| Chemical | 168 | .34 | 10.63 |
| Civil | 41 | .08 | 16.68 |
| Electrical/electronic | 199 | .40 | 12.36 |
| Industrial | 101 | .20 | 12.44 |
| Mechanical | 336 | .68 | 8.66 |
| Metallurgists/metallurgical | 253 | .51 | 9.23 |
| Mining | 15 | .03 | 22.21 |
| Safety | 55 | .11 | 8.60 |
| Other, n.e.c | 127 | .25 | (1) |
| Scientists | 499 | 1.00 | (1) |
| Operations and systems researchers and analysts | 18 | .03 | 21.30 |
| Chemists | 290 | .59 | 6.46 |
| All other physical scientists | 86 | .17 | 19.41 |
| Computer specialists | 105 | .21 | 11.60 |
| Technicians | 1,653 | 3.31 | (1) |
| Computer programmer | 82 | .16 | 10.07 |
| Drafter | 191 | .38 | 7.40 |
| Electrical/electronic technicians | 283 | .57 | 25.15 |
| Mechanical engineering technician | 60 | .12 | 28.06 |
| Tool programmer, numerical controls | 14 | .02 | 24.32 |
| Civil engineering technician | 10 | .02 | 25.29 |
| All other engineering technicians | 375 | .75 | (1) |
| Chemical technicians, except health | 570 | 1.16 | 8.31 |
| All other physical and life science technicians | 68 | .13 | 18.49 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR[4] 1983--con.

Secondary nonferrous metals (SIC 3340)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 906 | 5.06 | (1) |
| Engineers | 406 | 2.21 | (1) |
| Chemical | 15 | .08 | 48.21 |
| Civil | 15 | .08 | 23.94 |
| Electrical/electronic | 13 | .07 | 36.73 |
| Industrial | 38 | .20 | 17.05 |
| Mechanical | 23 | .12 | 22.63 |
| Metallurgists/metallurgical | 268 | 1.48 | 18.27 |
| Other, n.e.c. | 34 | .18 | (1) |
| Scientists | 171 | .94 | (1) |
| Chemists | 127 | .70 | 25.80 |
| All other physical scientists | 15 | .08 | 36.57 |
| Computer specialists | 29 | .16 | 35.98 |
| Technicians | 329 | 1.79 | (1) |
| Drafter | 27 | .14 | 23.85 |
| All other engineering technicians | 85 | .46 | (1) |
| Chemical technicians, except health | 166 | .91 | 28.24 |
| All other physical and life science technicians | 51 | .28 | 54.02 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Nonferrous rolling and drawing (SIC 3350)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 10,639 | 5.74 | (1) |
| Engineers | 5,556 | 3.01 | (1) |
| Chemical | 144 | .07 | 12.85 |
| Civil | 84 | .04 | 27.83 |
| Electrical/electronic | 785 | .43 | 10.21 |
| Industrial | 825 | .45 | 13.35 |
| Mechanical | 1,372 | .75 | 8.84 |
| Metallurgists/metallurgical | 918 | .50 | 9.23 |
| Safety | 150 | .08 | 14.38 |
| Other, n.e.c | 1,278 | .69 | (1) |
| Scientists | 1,126 | .60 | (1) |
| Operations and systems researchers and analysts | 41 | .02 | 27.26 |
| Chemists | 267 | .14 | 12.64 |
| All other physical scientists | 60 | .03 | 18.95 |
| Computer specialists | 758 | .41 | 19.77 |
| Technicians | 3,957 | 2.13 | (1) |
| Computer programmer | 520 | .28 | 10.18 |
| Drafter | 906 | .49 | 13.27 |
| Electrical/electronic technicians | 541 | .29 | 11.47 |
| Mechanical engineering technician | 219 | .12 | 10.14 |
| Tool programmer, numerical controls | 27 | .01 | 24.59 |
| Industrial engineering technicians | 187 | .10 | 14.03 |
| All other engineering technicians | 917 | .50 | (1) |
| Chemical technicians, except health | 593 | .32 | 11.95 |
| All other physical and life science technicians | 47 | .02 | 23.21 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Nonferrous foundries (castings) (SIC 3360)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 1,630 | 2.01 | (1) |
| Engineers | 923 | 1.15 | (1) |
| Electrical/electronic | 15 | .01 | 28.12 |
| Industrial | 225 | .29 | 7.37 |
| Mechanical | 264 | .34 | 7.34 |
| Metallurgists/metallurgical | 86 | .11 | 10.02 |
| Safety | 15 | .01 | 20.33 |
| Other, n.e.c. | 318 | .39 | (1) |
| Scientists | 88 | .09 | (1) |
| Operations and systems researchers and analysts | 7 | (1) | 23.47 |
| Chemists | 32 | .04 | 17.08 |
| All other physical scientists | 6 | (1) | 30.73 |
| Computer specialists | 43 | .05 | 12.88 |
| Technicians | 619 | .77 | (1) |
| Computer programmer | 78 | .10 | 9.14 |
| Drafter | 201 | .26 | 9.46 |
| Electrical/electronic technicians | 16 | .02 | 17.67 |
| Mechanical engineering technician | 48 | .06 | 19.74 |
| Tool programmer, numerical controls | 29 | .03 | 16.06 |
| Industrial engineering technicians | 77 | .10 | 12.37 |
| All other engineering technicians | 130 | .16 | 12.86 |
| Physical and life science technicians | 40 | .04 | (1) |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Miscellaneous primary metal products (SIC 3390)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 837 | 3.87 | (1) |
| Engineers | 597 | 2.72 | (1) |
| Electrical/electronic | 16 | .07 | 28.29 |
| Industrial | 55 | .25 | 20.65 |
| Mechanical | 59 | .27 | 12.85 |
| Metallurgists/metallurgical | 303 | 1.40 | 7.80 |
| Safety | 15 | .06 | 26.49 |
| Other, n.e.c. | 149 | .67 | (1) |
| Scientists | 40 | .18 | (1) |
| Physical scientists | 40 | .18 | (1) |
| Technicians | 200 | .90 | (1) |
| Computer programmer | 20 | .09 | 15.73 |
| Drafter | 34 | .15 | 17.74 |
| All other engineering technicians | 60 | .27 | (1) |
| Chemical technicians, except health | 74 | .34 | 18.52 |
| All other physical and life science technicians | 12 | .05 | 49.08 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Metal cans and shipping containers (SIC 3410)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 1,410 | 2.19 | (1) |
| Engineers | 670 | 1.03 | (1) |
| Chemical | 14 | .02 | 26.91 |
| Electrical/electronic | 37 | .05 | 18.70 |
| Industrial | 63 | .10 | 13.58 |
| Mechanical | 395 | .63 | 19.18 |
| Metallurgists/metallurgical | 18 | .02 | 35.96 |
| Other, n.e.c | 143 | .21 | (1) |
| Scientists | 59 | .08 | (1) |
| Chemists | 22 | .03 | 21.32 |
| Computer specialists | 37 | .05 | 20.24 |
| Technicians | 681 | 1.05 | (1) |
| Computer programmer | 98 | .15 | 32.81 |
| Drafter | 115 | .18 | 21.74 |
| Electrical/electronic technicians | 83 | .13 | 21.95 |
| Industrial engineering technicians | 5 | (1) | 33.46 |
| All other engineering technicians | 336 | .53 | (1) |
| Physical and life science technicians | 44 | .06 | (1) |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Cutlery, handtools, and hardware (SIC 3420)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 5,294 | 3.72 | (1) |
| Engineers | 2,806 | 1.99 | (1) |
| Chemical | 22 | .01 | 24.72 |
| Civil | 17 | .01 | 19.77 |
| Electrical/electronic | 99 | .07 | 14.84 |
| Industrial | 605 | .43 | 7.54 |
| Mechanical | 1,279 | .92 | 6.49 |
| Metallurgists/metallurgical | 108 | .07 | 14.90 |
| Safety | 48 | .03 | 15.89 |
| Other, n.e.c | 628 | .45 | (1) |
| Scientists | 606 | .41 | (1) |
| Operations and systems researchers and analysts | 77 | .05 | 35.88 |
| Physical scientists | 227 | .15 | (1) |
| Computer specialists | 302 | .21 | 14.82 |
| Technicians | 1,882 | 1.32 | (1) |
| Computer programmer | 416 | .30 | 10.50 |
| Drafter | 688 | .49 | 6.86 |
| Electrical/electronic technicians | 78 | .05 | 16.30 |
| Mechanical engineering technician | 139 | .10 | 16.21 |
| Tool programmer, numerical controls | 37 | .02 | 17.41 |
| Industrial engineering technicians | 168 | .12 | 9.77 |
| All other engineering technicians | 272 | .19 | (1) |
| Chemical technicians, except health | 64 | .04 | 20.03 |
| All other physical and life science technicians | 20 | .01 | 24.13 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Heating equipment and plumbing fixtures (SIC 3430)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 2,950 | 4.76 | (1) |
| Engineers | 1,611 | 2.61 | (1) |
| Chemical | 17 | .02 | 29.17 |
| Civil | 11 | .01 | 41.26 |
| Electrical/electronic | 62 | .10 | 21.86 |
| Industrial | 218 | .36 | 8.51 |
| Mechanical | 958 | 1.58 | 14.62 |
| Metallurgists/metallurgical | 24 | .03 | 22.12 |
| Safety | 17 | .02 | 19.68 |
| Other, n.e.c. | 304 | .49 | (1) |
| Scientists | 99 | .14 | (1) |
| Operations and systems researchers and analysts | 11 | .01 | 33.27 |
| Chemists | 4 | (1) | 48.73 |
| Computer specialists | 84 | .13 | 13.85 |
| Technicians | 1,240 | 2.01 | (1) |
| Computer programmer | 129 | .21 | 10.86 |
| Drafter | 723 | 1.19 | 9.12 |
| Electrical/electronic technicians | 53 | .08 | 25.83 |
| Mechanical engineering technician | 104 | .17 | 16.47 |
| Tool programmer, numerical controls | 26 | .04 | 20.85 |
| Industrial engineering technicians | 75 | .12 | 12.89 |
| All other engineering technicians | 105 | .16 | (1) |
| Chemical technicians, except health | 25 | .04 | 27.82 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Fabricated structural metal products (SIC 3440)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 30,476 | 7.05 | (1) |
| Engineers | 14,120 | 3.27 | (1) |
| Chemical | 143 | .03 | 37.10 |
| Civil | 898 | .21 | 11.22 |
| Electrical/electronic | 804 | .18 | 32.96 |
| Industrial | 911 | .21 | 16.13 |
| Mechanical | 5,506 | 1.29 | 12.39 |
| Metallurgists/metallurgical | 192 | .04 | 27.60 |
| Safety | 214 | .05 | 34.85 |
| Other, n.e.c. | 5,452 | 1.26 | (1) |
| Scientists | 982 | .21 | (1) |
| Operations and systems researchers and analysts | 107 | .02 | 51.19 |
| Chemists | 58 | .01 | 32.83 |
| Physicists and astronomers | 105 | .02 | 45.59 |
| All other physical scientists | 10 | (1) | 45.71 |
| Computer specialists | 702 | .16 | 15.01 |
| Technicians | 15,374 | 3.57 | (1) |
| Computer programmer | 844 | .19 | 9.31 |
| Drafter | 11,839 | 2.78 | 3.82 |
| Electrical/electronic technicians | 272 | .06 | 26.57 |
| Mechanical engineering technician | 743 | .17 | 24.13 |
| Tool programmer, numerical controls | 128 | .03 | 14.34 |
| Industrial engineering technicians | 153 | .03 | 19.90 |
| Civil engineering technician | 301 | .07 | 24.33 |
| All other engineering technicians | 986 | .23 | 24.74 |
| Chemical technicians, except health | 79 | .01 | 27.14 |
| All other physical and life science technicians | 29 | (1) | 41.35 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Screw machine products and bolts, nuts, and washers (SIC 3450)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 2,224 | 2.51 | (1) |
| Engineers | 1,315 | 1.50 | (1) |
| Chemical | 7 | (1) | 25.95 |
| Electrical/electronic | 21 | .02 | 26.03 |
| Industrial | 116 | .13 | 10.57 |
| Mechanical | 889 | 1.04 | 6.26 |
| Metallurgists/metallurgical | 45 | .05 | 12.37 |
| Safety | 12 | .01 | 19.54 |
| Other, n.e.c. | 225 | .25 | (1) |
| Scientists | 58 | .06 | (1) |
| Computer specialists | 58 | .06 | 22.20 |
| Technicians | 851 | .95 | (1) |
| Computer programmer | 124 | .14 | 10.04 |
| Drafter | 372 | .43 | 5.74 |
| Electrical/electronic technicians | 10 | .01 | 28.46 |
| Mechanical engineering technician | 132 | .15 | 18.43 |
| Tool programmer, numerical controls | 27 | .03 | 21.46 |
| Industrial engineering technicians | 62 | .07 | 17.34 |
| All other engineering technicians | 99 | .10 | (1) |
| Physical and life science technicians | 25 | .02 | (1) |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Metal forgings and stampings (SIC 3460)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 5,375 | 2.27 | (1) |
| Engineers | 2,992 | 1.28 | (1) |
| Chemical | 32 | .01 | 17.00 |
| Civil | 62 | .02 | 16.28 |
| Electrical/electronic | 88 | .03 | 9.82 |
| Industrial | 681 | .30 | 6.89 |
| Mechanical | 1,354 | .60 | 5.34 |
| Metallurgists/metallurgical | 191 | .08 | 12.77 |
| Safety | 115 | .05 | 11.95 |
| Other, n.e.c | 469 | .19 | (1) |
| Scientists | 256 | .10 | (1) |
| Operations and systems researchers and analysts | 52 | .02 | 16.74 |
| Chemists | 27 | .01 | 20.55 |
| Computer specialists | 177 | .07 | 19.22 |
| Technicians | 2,127 | .89 | (1) |
| Computer programmer | 250 | .11 | 8.97 |
| Drafter | 1,073 | .47 | 6.31 |
| Electrical/electronic technicians | 57 | .02 | 17.54 |
| Mechanical engineering technician | 148 | .06 | 14.22 |
| Tool programmer, numerical controls | 63 | .02 | 17.68 |
| Industrial engineering technicians | 132 | .05 | 10.75 |
| Civil engineering technician | 12 | (1) | 53.29 |
| All other engineering technicians | 291 | .12 | 13.53 |
| Chemical technicians, except health | 74 | .03 | 13.34 |
| All other physical and life science technicians | 27 | .01 | 37.91 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Coating, engraving, and allied services (SIC 3470)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 1,070 | 1.03 | (1) |
| Engineers | 513 | .51 | (1) |
| Chemical | 39 | .04 | 21.31 |
| Electrical/electronic | 20 | .02 | 44.60 |
| Industrial | 21 | .02 | 34.99 |
| Mechanical | 367 | .38 | 11.28 |
| Metallurgists/metallurgical | 8 | (1) | 44.54 |
| Other, n.e.c. | 58 | .05 | (1) |
| Scientists | 164 | .15 | (1) |
| Chemists | 150 | .15 | 11.92 |
| All other physical scientists | 6 | (1) | 38.72 |
| Computer specialists | 8 | (1) | 31.37 |
| Technicians | 393 | .37 | (1) |
| Computer programmer | 30 | .03 | 19.60 |
| Drafter | 132 | .13 | 17.77 |
| Electrical/electronic technicians | 17 | .01 | 29.58 |
| Mechanical engineering technician | 5 | (1) | 35.77 |
| All other engineering technicians | 33 | .03 | (1) |
| Chemical technicians, except health | 157 | .16 | 15.67 |
| All other physical and life science technicians | 19 | .01 | 44.19 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Ordnance and accessories, n.e.c. (SIC 3480)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 4,946 | 7.55 | (1) |
| Engineers | 2,872 | 4.40 | (1) |
| Chemical | 57 | .08 | 20.10 |
| Civil | 97 | .15 | 19.83 |
| Electrical/electronic | 573 | .88 | 32.28 |
| Industrial | 495 | .76 | 9.52 |
| Mechanical | 1,030 | 1.59 | 9.31 |
| Metallurgists/metallurgical | 52 | .08 | 14.63 |
| Safety | 121 | .18 | 13.43 |
| Other, n.e.c | 447 | .68 | (1) |
| Scientists | 358 | .54 | (1) |
| Operations and systems researchers and analysts | 47 | .07 | 29.31 |
| Chemists | 107 | .16 | 15.11 |
| All other physical scientists | 54 | .08 | (1) |
| Computer specialists | 150 | .23 | 11.69 |
| Technicians | 1,716 | 2.61 | (1) |
| Computer programmer | 173 | .26 | 15.84 |
| Drafter | 503 | .77 | 12.68 |
| Electrical/electronic technicians | 137 | .21 | 21.98 |
| Mechanical engineering technician | 125 | .19 | 25.95 |
| Tool programmer, numerical controls | 60 | .09 | 16.10 |
| Industrial engineering technicians | 184 | .28 | 30.97 |
| Civil engineering technician | 9 | .01 | 37.67 |
| All other engineering technicians | 300 | .46 | 15.13 |
| Chemical technicians, except health | 208 | .32 | 36.13 |
| All other physical and life science technicians | 17 | .02 | 32.80 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Miscellaneous fabricated metal products (SIC 3490)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 11,213 | 5.16 | (1) |
| Engineers | 6,007 | 2.77 | (1) |
| Chemical | 53 | .02 | 15.74 |
| Electrical/electronic | 277 | .13 | 21.46 |
| Industrial | 817 | .38 | 4.77 |
| Mechanical | 3,353 | 1.57 | 4.73 |
| Metallurgists/metallurgical | 137 | .06 | 10.07 |
| Safety | 38 | .01 | 12.70 |
| Nuclear | 7 | (1) | 34.69 |
| Other, n.e.c | 1,325 | .60 | (1) |
| Scientists | 535 | .23 | (1) |
| Operations and systems researchers and analysts | 41 | .01 | 28.53 |
| Chemists | 90 | .04 | 22.31 |
| All other physical scientists | 31 | .01 | 32.09 |
| Computer specialists | 373 | .17 | 9.05 |
| Technicians | 4,671 | 2.16 | (1) |
| Computer programmer | 449 | .21 | 5.46 |
| Drafter | 2,408 | 1.13 | 5.64 |
| Electrical/electronic technicians | 307 | .14 | 23.68 |
| Mechanical engineering technician | 515 | .24 | 13.24 |
| Tool programmer, numerical controls | 204 | .09 | 9.21 |
| Industrial engineering technicians | 296 | .13 | 12.49 |
| All other engineering technicians | 367 | .17 | 14.01 |
| Physical and life science technicians | 125 | .05 | (1) |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Engines and turbines (SIC 3510)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 14,213 | 13.07 | (1) |
| Engineers | 7,023 | 6.48 | (1) |
| Chemical | 177 | .16 | 37.02 |
| Civil | 75 | .06 | 21.55 |
| Electrical/electronic | 937 | .87 | 25.13 |
| Industrial | 818 | .76 | 10.35 |
| Mechanical | 2,721 | 2.53 | 11.78 |
| Metallurgists/metallurgical | 277 | .25 | 19.17 |
| Safety | 70 | .06 | 9.69 |
| Other, n.e.c | 1,948 | 1.79 | (1) |
| Scientists | 1,620 | 1.47 | (1) |
| Operations and systems researchers and analysts | 46 | .04 | 20.85 |
| Statistician | 157 | .14 | 37.68 |
| Chemists | 361 | .33 | 51.10 |
| All other physical scientists | 318 | .28 | (1) |
| Computer specialists | 738 | .68 | 16.31 |
| Technicians | 5,570 | 5.12 | (1) |
| Computer programmer | 567 | .52 | 15.47 |
| Drafter | 1,309 | 1.21 | 14.50 |
| Electrical/electronic technicians | 716 | .66 | 24.37 |
| Mechanical engineering technician | 781 | .72 | 17.82 |
| Tool programmer, numerical controls | 220 | .20 | 14.33 |
| Industrial engineering technicians | 317 | .29 | 18.12 |
| Civil engineering technician | 9 | (1) | 45.67 |
| All other engineering technicians | 1,311 | 1.21 | 23.79 |
| Chemical technicians, except health | 238 | .22 | 31.14 |
| All other physical and life science technicians | 102 | .09 | 31.16 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Farm and garden machinery and equipment (SIC 3520)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 7,969 | 7.22 | (1) |
| Engineers | 4,186 | 3.81 | (1) |
| Civil | 15 | .01 | 47.04 |
| Electrical/electronic | 225 | .20 | 30.14 |
| Industrial | 760 | .70 | 10.01 |
| Mechanical | 1,364 | 1.24 | 15.52 |
| Metallurgists/metallurgical | 63 | .05 | 17.61 |
| Safety | 38 | .03 | 15.92 |
| Other, n.e.c. | 1,741 | 1.58 | (1) |
| Scientists | 573 | .50 | (1) |
| Operations and systems researchers and analysts | 226 | .20 | 38.66 |
| Statistician | 10 | (1) | 37.68 |
| Physical scientists | 13 | .01 | (1) |
| Computer specialists | 324 | .29 | 15.62 |
| Technicians | 3,210 | 2.91 | (1) |
| Computer programmer | 374 | .34 | 16.85 |
| Drafter | 1,201 | 1.10 | 6.15 |
| Electrical/electronic technicians | 103 | .09 | 15.77 |
| Mechanical engineering technician | 282 | .26 | 14.29 |
| Tool programmer, numerical controls | 75 | .06 | 27.66 |
| Industrial engineering technicians | 348 | .32 | 19.23 |
| Civil engineering technician | 7 | (1) | 38.06 |
| All other engineering technicians | 747 | .68 | 23.29 |
| Physical and life science technicians | 56 | .05 | (1) |
| Mathematical technician | 17 | .01 | 39.28 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Construction and related machinery and equipment (SIC 3530)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 29,205 | 11.39 | (1) |
| Engineers | 15,928 | 6.22 | (1) |
| Agricultural | 119 | .04 | 38.02 |
| Civil | 386 | .15 | 30.35 |
| Electrical/electronic | 1,609 | .63 | 11.25 |
| Industrial | 2,003 | .78 | 8.14 |
| Mechanical | 7,552 | 2.97 | 7.67 |
| Metallurgists/metallurgical | 331 | .13 | 11.59 |
| Safety | 107 | .04 | 16.12 |
| Other, n.e.c | 3,821 | 1.48 | (1) |
| Scientists | 1,379 | .52 | (1) |
| Statistician | 26 | .01 | 29.54 |
| Chemists | 44 | .01 | 22.93 |
| All other physical scientists | 21 | (1) | (1) |
| Computer specialists | 1,288 | .50 | 23.49 |
| Technicians | 11,898 | 4.65 | (1) |
| Computer programmer | 1,149 | .45 | 16.31 |
| Drafter | 5,518 | 2.17 | 6.17 |
| Electrical/electronic technicians | 999 | .39 | 13.36 |
| Mechanical engineering technician | 1,048 | .41 | 9.76 |
| Tool programmer, numerical controls | 525 | .20 | 7.82 |
| Industrial engineering technicians | 933 | .36 | 14.23 |
| Civil engineering technician | 34 | .01 | 38.46 |
| All other engineering technicians | 1,125 | .44 | 12.54 |
| Chemical technicians, except health | 463 | .18 | 33.99 |
| All other physical and life science technicians | 104 | .04 | 29.09 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Metalworking machinery and equipment (SIC 3540)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 19,228 | 6.91 | (1) |
| Engineers | 9,966 | 3.59 | (1) |
| Civil | 31 | .01 | 23.85 |
| Electrical/electronic | 1,397 | .50 | 6.97 |
| Industrial | 1,622 | .59 | 6.03 |
| Mechanical | 5,204 | 1.89 | 4.40 |
| Metallurgists/metallurgical | 176 | .06 | 22.73 |
| Safety | 60 | .02 | 14.16 |
| Other, n.e.c | 1,476 | .52 | (1) |
| Scientists | 653 | .22 | (1) |
| Operations and systems researchers and analysts | 38 | .01 | 23.41 |
| Statistician | 15 | (1) | 33.39 |
| Physical scientists | 45 | .01 | (1) |
| Computer specialists | 555 | .20 | 12.20 |
| Technicians | 8,609 | 3.10 | (1) |
| Computer programmer | 612 | .22 | 10.04 |
| Drafter | 4,909 | 1.79 | 4.71 |
| Electrical/electronic technicians | 731 | .26 | 9.66 |
| Mechanical engineering technician | 761 | .27 | 11.08 |
| Tool programmer, numerical controls | 727 | .26 | 8.12 |
| Industrial engineering technicians | 270 | .09 | 12.42 |
| All other engineering technicians | 599 | .21 | (1) |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Special industry machery except metalworking (SIC 3550)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 18,203 | 12.28 | (1) |
| Engineers | 10,085 | 6.26 | (1) |
| Agricultural | 22 | .01 | 32.80 |
| Chemical | 229 | .14 | 23.31 |
| Civil | 26 | .01 | 23.48 |
| Electrical/electronic | 2,388 | 1.49 | 19.74 |
| Industrial | 1,493 | .93 | 18.28 |
| Mechanical | 4,541 | 2.84 | 3.31 |
| Metallurgists/metallurgical | 41 | .02 | 16.43 |
| Safety | 61 | .03 | 19.33 |
| Other, n.e.c | 1,284 | .79 | (1) |
| Scientists | 712 | .43 | (1) |
| Operations and systems researchers and analysts | 36 | .02 | 16.33 |
| Chemists | 200 | .12 | 30.56 |
| All other physical scientists | 7 | (1) | (1) |
| Computer specialists | 469 | .29 | 14.09 |
| Technicians | 7,406 | 4.61 | (1) |
| Drafter | 3,985 | 2.50 | 3.34 |
| Electrical/electronic technicians | 1,620 | 1.01 | 15.19 |
| Mechanical engineering technician | 509 | .31 | 9.13 |
| Tool programmer, numerical controls | 352 | .22 | 6.95 |
| Industrial engineering technicians | 275 | .17 | 9.48 |
| All other engineering technicians | 434 | .27 | (1) |
| Physical and life science technicians | 231 | .13 | (1) |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

General industrial machinery and equipment (SIC 3560)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 24,251 | 9.56 | (1) |
| Engineers | 12,783 | 5.06 | (1) |
| Agricultural | 9 | (1) | 39.90 |
| Chemical | 204 | .08 | 21.29 |
| Civil | 118 | .04 | 29.82 |
| Electrical/electronic | 1,338 | .53 | 7.40 |
| Industrial | 2,246 | .89 | 5.50 |
| Mechanical | 5,657 | 2.25 | 5.40 |
| Metallurgists/metallurgical | 305 | .12 | 13.44 |
| Safety | 45 | .01 | 11.82 |
| Other, n.e.c | 2,861 | 1.14 | (1) |
| Scientists | 1,109 | .41 | (1) |
| Operations and systems researchers and analysts | 69 | .02 | 13.72 |
| Statistician | 19 | (1) | 25.13 |
| Chemists | 158 | .06 | 26.42 |
| Physicists and astronomers | 7 | (1) | 39.64 |
| All other physical scientists | 74 | .02 | 48.76 |
| Computer specialists | 782 | .31 | 6.46 |
| Technicians | 10,359 | 4.09 | (1) |
| Computer programmer | 800 | .31 | 5.01 |
| Drafter | 4,899 | 1.95 | 3.81 |
| Electrical/electronic technicians | 1,090 | .43 | 8.61 |
| Mechanical engineering technician | 1,245 | .49 | 7.40 |
| Tool programmer, numerical controls | 452 | .18 | 6.22 |
| Industrial engineering technicians | 678 | .27 | 8.00 |
| All other engineering technicians | 999 | .39 | (1) |
| Chemical technicians, except health | 156 | .06 | 20.50 |
| All other physical and life science technicians | 32 | .01 | 37.73 |
| Mathematical technician | 8 | (1) | 38.32 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Office, computing, and accounting machines (SIC 3570)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 126,069 | 26.20 | (1) |
| Engineers | 60,716 | 12.65 | (1) |
| Chemical | 344 | .07 | 26.11 |
| Civil | 149 | .03 | 44.33 |
| Electrical/electronic | 34,431 | 7.19 | 9.30 |
| Industrial | 9,824 | 2.05 | 14.09 |
| Mechanical | 7,143 | 1.49 | 13.81 |
| Metallurgists/metallurgical | 203 | .04 | 26.17 |
| Safety | 157 | .03 | 14.57 |
| Other, n.e.c. | 8,465 | 1.75 | (1) |
| Scientists | 9,642 | 1.98 | (1) |
| Operations and systems researchers and analysts | 1,420 | .29 | 27.81 |
| Statistician | 146 | .03 | 29.89 |
| All other mathematicians | 464 | .09 | 52.50 |
| Chemists | 130 | .02 | 19.86 |
| Physicists and astronomers | 33 | (1) | 32.35 |
| All other physical scientists | 52 | .01 | 66.24 |
| Computer specialists | 7,397 | 1.54 | 10.52 |
| Technicians | 55,711 | 11.57 | (1) |
| Computer programmer | 18,053 | 3.77 | 16.16 |
| Drafter | 4,915 | 1.02 | 6.86 |
| Electrical/electronic technicians | 23,058 | 4.81 | 6.41 |
| Mechanical engineering technician | 2,095 | .43 | 19.37 |
| Tool programmer, numerical controls | 586 | .12 | 42.03 |
| Industrial engineering technicians | 1,273 | .26 | 21.86 |
| Civil engineering technician | 91 | .01 | 30.12 |
| All other engineering technicians | 5,152 | 1.07 | 14.96 |
| Chemical technicians, except health | 276 | .05 | 29.09 |
| All other physical and life science technicians | 79 | .01 | 45.06 |
| Mathematical technician | 133 | .02 | 41.00 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Refrigeration and service industry machinery (SIC 3580)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 11,392 | 7.16 | (1) |
| Engineers | 5,205 | 3.27 | (1) |
| Chemical | 117 | .07 | 34.34 |
| Civil | 24 | .01 | 24.08 |
| Electrical/electronic | 674 | .43 | 9.87 |
| Industrial | 1,139 | .72 | 9.49 |
| Mechanical | 1,945 | 1.24 | 9.98 |
| Metallurgists/metallurgical | 30 | .01 | 29.57 |
| Safety | 38 | .02 | 12.64 |
| Other, n.e.c. | 1,238 | .77 | (1) |
| Scientists | 624 | .38 | (1) |
| Statistician | 96 | .06 | 49.31 |
| Chemists | 42 | .02 | 25.13 |
| All other physical scientists | 49 | .03 | 41.38 |
| Computer specialists | 437 | .27 | 15.22 |
| Technicians | 5,563 | 3.51 | (1) |
| Computer programmer | 483 | .30 | 12.18 |
| Drafter | 2,482 | 1.58 | 6.15 |
| Electrical/electronic technicians | 785 | .50 | 13.98 |
| Mechanical engineering technician | 753 | .48 | 18.52 |
| Tool programmer, numerical controls | 77 | .04 | 11.74 |
| Industrial engineering technicians | 347 | .22 | 16.18 |
| All other engineering technicians | 572 | .36 | (1) |
| Chemical technicians, except health | 40 | .02 | 23.00 |
| All other physical and life science technicians | 24 | .01 | 34.30 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Miscellaneous machinery, except electrical (SIC 3590)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 7,632 | 3.12 | (1) |
| Engineers | 4,371 | 1.80 | (1) |
| Chemical | 8 | (1) | 44.72 |
| Electrical/electronic | 418 | .17 | 13.24 |
| Industrial | 1,005 | .42 | 6.44 |
| Mechanical | 2,111 | .88 | 6.17 |
| Metallurgists/metallurgical | 66 | .02 | 11.70 |
| Safety | 26 | .01 | 18.40 |
| Other, n.e.c | 737 | .30 | (1) |
| Scientists | 189 | .06 | (1) |
| Operations and systems researchers and analysts | 25 | .01 | 16.34 |
| Physical scientists | 30 | (1) | (1) |
| Computer specialists | 134 | .05 | 9.15 |
| Technicians | 3,072 | 1.26 | (1) |
| Computer programmer | 244 | .10 | 10.67 |
| Drafter | 1,790 | .75 | 5.88 |
| Electrical/electronic technicians | 244 | .10 | 14.88 |
| Mechanical engineering technician | 171 | .07 | 12.78 |
| Tool programmer, numerical controls | 283 | .11 | 16.48 |
| Industrial engineering technicians | 76 | .03 | 10.93 |
| All other engineering technicians | 232 | .09 | (1) |
| Physical and life science technicians | 32 | .01 | (1) |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Electrical transmission and distribution equipment (SIC 3610)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 9,675 | 8.89 | (1) |
| Engineers | 4,788 | 4.41 | (1) |
| Chemical | 29 | .02 | 32.73 |
| Civil | 11 | .01 | 31.75 |
| Electrical/electronic | 2,604 | 2.42 | 4.87 |
| Industrial | 787 | .73 | 7.05 |
| Mechanical | 665 | .61 | 7.10 |
| Metallurgists/metallurgical | 41 | .03 | 27.93 |
| Safety | 39 | .03 | 12.24 |
| Other, n.e.c | 612 | .56 | (1) |
| Scientists | 362 | .32 | (1) |
| Operations and systems researchers and analysts | 44 | .04 | 30.96 |
| Statistician | 5 | (1) | 34.05 |
| Physical scientists | 33 | .02 | (1) |
| Computer specialists | 280 | .26 | 8.45 |
| Technicians | 4,525 | 4.16 | (1) |
| Computer programmer | 405 | .37 | 9.45 |
| Drafter | 1,942 | 1.80 | 5.80 |
| Electrical/electronic technicians | 1,524 | 1.41 | 7.32 |
| Mechanical engineering technician | 184 | .17 | 14.94 |
| Tool programmer, numerical controls | 51 | .04 | 13.92 |
| Industrial engineering technicians | 219 | .20 | 15.61 |
| All other engineering technicians | 159 | .14 | (1) |
| Chemical technicians, except health | 37 | .03 | 29.48 |
| All other physical and life science technicians | 4 | (1) | 39.52 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Electrical industrial apparatus (SIC 3620)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 22,710 | 11.50 | (1) |
| Engineers | 12,655 | 6.43 | (1) |
| Chemical | 320 | .16 | 29.51 |
| Civil | 20 | .01 | 21.03 |
| Electrical/electronic | 5,539 | 2.83 | 8.15 |
| Industrial | 2,027 | 1.03 | 7.48 |
| Mechanical | 2,325 | 1.18 | 7.96 |
| Metallurgists/metallurgical | 305 | .15 | 29.52 |
| Safety | 82 | .04 | 11.62 |
| Other, n.e.c | 2,037 | 1.03 | (1) |
| Scientists | 889 | .43 | (1) |
| Operations and systems researchers and analysts | 84 | .04 | 23.26 |
| Statistician | 34 | .01 | 37.04 |
| Chemists | 103 | .05 | 38.57 |
| All other physical scientists | 172 | .08 | (1) |
| Computer specialists | 496 | .25 | 10.68 |
| Technicians | 9,166 | 4.64 | (1) |
| Computer programmer | 683 | .34 | 13.76 |
| Drafter | 2,984 | 1.52 | 7.08 |
| Electrical/electronic technicians | 2,935 | 1.50 | 7.31 |
| Mechanical engineering technician | 474 | .24 | 12.53 |
| Tool programmer, numerical controls | 167 | .08 | 13.38 |
| Industrial engineering technicians | 360 | .18 | 9.94 |
| Civil engineering technician | 20 | .01 | 35.84 |
| All other engineering technicians | 1,250 | .63 | 18.91 |
| Chemical technicians, except health | 146 | .07 | 17.86 |
| All other physical and life science technicians | 147 | .07 | 40.03 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Household appliances (SIC 3630)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 6,141 | 4.22 | (1) |
| Engineers | 3,549 | 2.47 | (1) |
| Chemical | 57 | .04 | 29.81 |
| Civil | 42 | .02 | 27.30 |
| Electrical/electronic | 688 | .48 | 28.32 |
| Industrial | 964 | .68 | 8.11 |
| Mechanical | 1,181 | .83 | 14.07 |
| Metallurgists/metallurgical | 76 | .05 | 36.58 |
| Safety | 37 | .02 | 11.27 |
| Other, n.e.c. | 504 | .35 | (1) |
| Scientists | 438 | .29 | (1) |
| Operations and systems researchers and analysts | 8 | (1) | 30.10 |
| Chemists | 53 | .03 | 18.39 |
| All other physical scientists | 21 | .01 | (1) |
| Computer specialists | 356 | .25 | 11.46 |
| Technicians | 2,154 | 1.46 | (1) |
| Computer programmer | 331 | .23 | 16.49 |
| Drafter | 618 | .43 | 7.37 |
| Electrical/electronic technicians | 452 | .31 | 15.42 |
| Mechanical engineering technician | 221 | .15 | 16.19 |
| Tool programmer, numerical controls | 14 | (1) | 23.03 |
| Industrial engineering technicians | 167 | .11 | 12.21 |
| All other engineering technicians | 271 | .18 | (1) |
| Physical and life science technicians | 80 | .05 | (1) |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Electric lighting and wiring equipment (SIC 3640)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 11,870 | 6.24 | (1) |
| Engineers | 6,780 | 3.58 | (1) |
| Chemical | 268 | .14 | 34.94 |
| Civil | 25 | .01 | 27.53 |
| Electrical/electronic | 1,870 | 1.00 | 8.04 |
| Industrial | 1,749 | .93 | 16.01 |
| Mechanical | 1,657 | .88 | 11.67 |
| Metallurgists/metallurgical | 71 | .03 | 19.08 |
| Safety | 32 | .01 | 11.52 |
| Other, n.e.c | 1,108 | .58 | (1) |
| Scientists | 720 | .36 | (1) |
| Operations and systems researchers and analysts | 63 | .03 | 20.68 |
| Statistician | 46 | .02 | 25.53 |
| Chemists | 70 | .03 | 23.79 |
| All other physical scientists | 9 | (1) | (1) |
| Computer specialists | 532 | .28 | 15.93 |
| Technicians | 4,370 | 2.30 | (1) |
| Computer programmer | 512 | .27 | 10.84 |
| Drafter | 1,541 | .82 | 7.97 |
| Electrical/electronic technicians | 1,036 | .55 | 8.54 |
| Mechanical engineering technician | 569 | .30 | 28.22 |
| Tool programmer, numerical controls | 33 | .01 | 22.14 |
| Industrial engineering technicians | 246 | .13 | 12.02 |
| Civil engineering technician | 11 | (1) | 29.59 |
| All other engineering technicians | 284 | .15 | 11.16 |
| Chemical technicians, except health | 119 | .06 | 24.24 |
| All other physical and life science technicians | 19 | .01 | 30.14 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Radio and television receiving equipment (SIC 3650)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 7,147 | 8.32 | (1) |
| Engineers | 3,852 | 4.44 | (1) |
| Chemical | 16 | .01 | 39.57 |
| Electrical/electronic | 1,968 | 2.29 | 20.69 |
| Industrial | 331 | .38 | 12.63 |
| Mechanical | 338 | .39 | 16.74 |
| Safety | 12 | .01 | 19.89 |
| Other, n.e.c | 1,187 | 1.36 | (1) |
| Scientists | 294 | .33 | (1) |
| Physical scientists | 35 | .03 | (1) |
| Computer specialists | 259 | .30 | 22.62 |
| Technicians | 3,001 | 3.46 | (1) |
| Computer programmer | 320 | .37 | 18.16 |
| Drafter | 570 | .66 | 18.29 |
| Electrical/electronic technicians | 1,445 | 1.68 | 14.84 |
| Mechanical engineering technician | 90 | .10 | 34.38 |
| Industrial engineering technicians | 63 | .07 | 26.78 |
| All other engineering technicians | 495 | .57 | 40.95 |
| Chemical technicians, except health | 11 | .01 | 42.25 |
| All other physical and life science technicians | 7 | (1) | 55.14 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Communication equipment (SIC 3660)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 148,864 | 25.82 | (1) |
| Engineers | 89,856 | 15.62 | (1) |
| Chemical | 760 | .13 | 25.83 |
| Electrical/electronic | 63,608 | 11.08 | .75 |
| Industrial | 6,228 | 1.08 | 9.51 |
| Mechanical | 7,468 | 1.30 | 15.86 |
| Metallurgists/metallurgical | 375 | .06 | 18.70 |
| Safety | 273 | .04 | 16.96 |
| Other, n.e.c. | 11,144 | 1.93 | (1) |
| Scientists | 6,418 | 1.08 | (1) |
| Operations and systems researchers and analysts | 460 | .08 | 27.06 |
| Statistician | 72 | .01 | 34.03 |
| All other mathematicians | 36 | (1) | 41.99 |
| Chemists | 110 | .01 | 23.78 |
| All other physical scientists | 1,432 | .24 | (1) |
| Life scientists | 24 | (1) | 42.10 |
| Computer specialists | 4,284 | .74 | 10.49 |
| Technicians | 52,590 | 9.12 | (1) |
| Computer programmer | 6,042 | 1.05 | 12.57 |
| Drafter | 8,832 | 1.53 | 7.39 |
| Electrical/electronic technicians | 28,161 | 4.90 | 6.84 |
| Mechanical engineering technician | 2,072 | .36 | 11.28 |
| Tool programmer, numerical controls | 690 | .12 | 20.58 |
| Industrial engineering technicians | 1,236 | .21 | 16.63 |
| All other engineering technicians | 4,998 | .86 | (1) |
| Physical and life science technicians | 383 | .06 | (1) |
| Mathematical technician | 176 | .03 | 43.41 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Electronic components and accessories (SIC 3670)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 97,762 | 16.66 | (1) |
| Engineers | 46,129 | 7.89 | (1) |
| Chemical | 1,648 | .28 | 13.62 |
| Civil | 552 | .09 | 68.90 |
| Electrical/electronic | 28,088 | 4.82 | 8.15 |
| Industrial | 5,597 | .96 | 24.13 |
| Mechanical | 4,855 | .83 | 16.37 |
| Metallurgists/metallurgical | 659 | .11 | 18.03 |
| Safety | 252 | .04 | 28.39 |
| Other, n.e.c | 4,478 | .76 | (1) |
| Scientists | 5,220 | .86 | (1) |
| Operations and systems researchers and analysts | 344 | .05 | 44.15 |
| Statistician | 85 | .01 | 41.80 |
| All other mathematicians | 21 | (1) | 52.31 |
| Chemists | 514 | .08 | 19.11 |
| Physicists and astronomers | 258 | .04 | 49.57 |
| All other physical scientists | 67 | .01 | 41.90 |
| Computer specialists | 3,931 | .67 | 49.24 |
| Technicians | 46,413 | 7.91 | (1) |
| Computer programmer | 5,081 | .87 | 32.79 |
| Drafter | 5,773 | .99 | 19.91 |
| Electrical/electronic technicians | 23,423 | 4.02 | 16.21 |
| Mechanical engineering technician | 4,190 | .71 | 46.07 |
| Tool programmer, numerical controls | 604 | .10 | 23.84 |
| Industrial engineering technicians | 1,958 | .33 | 55.27 |
| Civil engineering technician | 153 | .02 | 61.12 |
| All other engineering technicians | 3,959 | .67 | 39.27 |
| Chemical technicians, except health | 1,157 | .19 | 19.67 |
| All other physical and life science technicians | 91 | .01 | 39.65 |
| Mathematical technician | 24 | (1) | 44.79 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Miscellaneous electrical equipment and supplies (SIC 3690)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 10,715 | 7.30 | (1) |
| Engineers | 5,620 | 3.85 | (1) |
| Chemical | 219 | .15 | 22.10 |
| Civil | 61 | .04 | 34.08 |
| Electrical/electronic | 1,742 | 1.20 | 12.76 |
| Industrial | 1,010 | .69 | 15.85 |
| Mechanical | 887 | .61 | 8.45 |
| Metallurgists/metallurgical | 79 | .05 | 28.15 |
| Safety | 105 | .07 | 22.98 |
| Other, n.e.c | 1,517 | 1.04 | (1) |
| Scientists | 759 | .50 | (1) |
| Operations and systems researchers and analysts | 90 | .06 | 37.66 |
| Statistician | 36 | .02 | 41.36 |
| Chemists | 174 | .12 | 21.21 |
| Physicists and astronomers | 12 | (1) | 36.51 |
| All other physical scientists | 49 | .03 | 36.47 |
| Life scientists | 77 | .05 | 43.61 |
| Computer specialists | 321 | .22 | 15.12 |
| Technicians | 4,336 | 2.95 | (1) |
| Computer programmer | 456 | .31 | 18.99 |
| Drafter | 1,007 | .69 | 17.76 |
| Electrical/electronic technicians | 1,524 | 1.05 | 11.25 |
| Mechanical engineering technician | 246 | .17 | 35.34 |
| Tool programmer, numerical controls | 12 | (1) | 40.31 |
| Industrial engineering technicians | 133 | .09 | 20.11 |
| All other engineering technicians | 625 | .42 | (1) |
| Chemical technicians, except health | 223 | .15 | 25.30 |
| All other physical and life science technicians | 110 | .07 | 32.55 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Motor vehicles and equipment (SIC 3710)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 60,671 | 7.94 | (1) |
| Engineers | 32,935 | 4.33 | (1) |
| Chemical | 27 | (1) | 21.88 |
| Civil | 245 | .03 | 12.64 |
| Electrical/electronic | 439 | .05 | 19.44 |
| Industrial | 5,652 | .75 | 10.46 |
| Mechanical | 2,766 | .36 | 7.53 |
| Metallurgists/metallurgical | 325 | .04 | 9.46 |
| Safety | 354 | .04 | 7.06 |
| Other, n.e.c | 23,127 | 3.06 | (1) |
| Scientists | 6,104 | .79 | (1) |
| Operations and systems researchers and analysts | 178 | .02 | 12.51 |
| Statistician | 1,704 | .22 | 18.09 |
| Chemists | 90 | .01 | 21.77 |
| All other physical scientists | 770 | .10 | 25.18 |
| Computer specialists | 3,362 | .44 | 15.31 |
| Technicians | 21,632 | 2.82 | (1) |
| Computer programmer | 2,138 | .28 | 11.31 |
| Drafter | 6,455 | .85 | 14.24 |
| Electrical/electronic technicians | 401 | .05 | 20.70 |
| Mechanical engineering technician | 1,368 | .18 | 23.98 |
| Tool programmer, numerical controls | 98 | .01 | 20.77 |
| Industrial engineering technicians | 751 | .09 | 11.20 |
| All other engineering technicians | 9,921 | 1.31 | (1) |
| Chemical technicians, except health | 121 | .01 | 15.69 |
| All other physical and life science technicians | 366 | .04 | 31.89 |
| Mathematical technician | 13 | (1) | 23.07 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Aircraft and parts (SIC 3720)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 122,802 | 21.21 | (1) |
| Engineers | 81,114 | 14.05 | (1) |
| Aeronautical | 26,787 | 4.65 | 1.10 |
| Chemical | 864 | .15 | 24.76 |
| Civil | 1,172 | .20 | 24.47 |
| Electrical/electronic | 12,942 | 2.24 | 18.02 |
| Industrial | 8,467 | 1.47 | 13.56 |
| Mechanical | 14,705 | 2.55 | 16.06 |
| Metallurgists/metallurgical | 2,387 | .41 | 24.52 |
| Safety | 776 | .13 | 22.93 |
| Other, n.e.c | 13,014 | 2.25 | (1) |
| Scientists | 7,956 | 1.36 | (1) |
| Operations and systems researchers and analysts | 1,134 | .19 | 28.64 |
| Statistician | 412 | .07 | 28.02 |
| All other mathematicians | 480 | .08 | 35.32 |
| Chemists | 313 | .05 | 19.69 |
| All other physical scientists | 370 | .06 | 37.41 |
| Computer specialists | 5,247 | .91 | 28.43 |
| Technicians | 33,732 | 5.80 | (1) |
| Computer programmer | 3,685 | .64 | 21.29 |
| Drafter | 6,043 | 1.04 | 17.13 |
| Electrical/electronic technicians | 6,375 | 1.10 | 23.69 |
| Mechanical engineering technician | 4,249 | .73 | 18.95 |
| Tool programmer, numerical controls | 1,174 | .20 | 15.67 |
| Industrial engineering technicians | 2,433 | .42 | 32.11 |
| Civil engineering technician | 502 | .08 | 30.71 |
| All other engineering technicians | 7,517 | 1.30 | 18.05 |
| Chemical technicians, except health | 866 | .15 | 35.75 |
| All other physical and life science technicians | 204 | .03 | 40.04 |
| Mathematical technician | 684 | .11 | 45.60 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Ship and boat building and repair (SIC 3730)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 10,113 | 5.28 | (1) |
| Engineers | 5,019 | 2.63 | (1) |
| Chemical | 78 | .04 | 18.60 |
| Civil | 439 | .23 | 36.54 |
| Electrical/electronic | 947 | .50 | 27.27 |
| Industrial | 468 | .25 | 15.16 |
| Marine | 662 | .35 | 18.75 |
| Mechanical | 1,397 | .74 | 24.96 |
| Metallurgists/metallurgical | 83 | .04 | 26.56 |
| Safety | 145 | .07 | 17.02 |
| Other, n.e.c | 800 | .41 | (1) |
| Scientists | 356 | .17 | (1) |
| Operations and systems researchers and analysts | 56 | .02 | 22.46 |
| Physical scientists | 103 | .05 | (1) |
| Computer specialists | 197 | .10 | 17.42 |
| Technicians | 4,738 | 2.48 | (1) |
| Computer programmer | 496 | .26 | 27.70 |
| Drafter | 2,842 | 1.52 | 27.11 |
| Tool programmer, numerical controls | 107 | .05 | 22.85 |
| Industrial engineering technicians | 56 | .02 | 34.63 |
| Civil engineering technician | 23 | .01 | 37.57 |
| All other engineering technicians | 1,109 | .58 | (1) |
| Physical and life science technicians | 105 | .04 | (1) |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Railroad equipment (SIC 3740)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 2,572 | 8.55 | (1) |
| Engineers | 1,427 | 4.76 | (1) |
| Chemical | 16 | .05 | 29.58 |
| Industrial | 162 | .54 | 14.56 |
| Mechanical | 379 | 1.27 | 25.56 |
| Other, n.e.c. | 870 | 2.90 | (1) |
| Scientists | 202 | .66 | (1) |
| Statistician | 59 | .19 | 33.89 |
| Computer specialists | 143 | .47 | 32.01 |
| Technicians | 943 | 3.13 | (1) |
| Computer programmer | 94 | .31 | 24.91 |
| Drafter | 531 | 1.78 | 23.77 |
| Mechanical engineering technician | 41 | .13 | 30.42 |
| Tool programmer, numerical controls | 52 | .17 | 25.28 |
| Industrial engineering technicians | 100 | .33 | 35.56 |
| All other engineering technicians | 125 | .41 | (1) |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Motorbicycles, bicycles, and parts (SIC 3750)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 405 | 2.74 | (1) |
| Engineers | 216 | 1.38 | (1) |
| Electrical/electronic | 10 | .06 | 20.00 |
| Industrial | 57 | .37 | 22.18 |
| Mechanical | 82 | .53 | 24.32 |
| Safety | 6 | .03 | 33.74 |
| Other, n.e.c. | 61 | .39 | (1) |
| Scientists | 55 | .34 | (1) |
| Physical scientists | 12 | .06 | (1) |
| Computer specialists | 43 | .28 | 32.14 |
| Technicians | 134 | .85 | (1) |
| Computer programmer | 33 | .21 | 12.30 |
| Drafter | 58 | .37 | 19.87 |
| Mechanical engineering technician | 25 | .16 | 28.87 |
| All other engineering technicians | 18 | .11 | (1) |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Guided missiles and space vehicles and parts (SIC 3760)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 50,861 | 36.52 | (1) |
| Engineers | 36,422 | 26.19 | (1) |
| Aeronautical | 2,323 | 1.67 | 25.47 |
| Chemical | 266 | .19 | 36.94 |
| Civil | 948 | .68 | 58.29 |
| Electrical/electronic | 6,531 | 4.70 | 28.70 |
| Industrial | 3,904 | 2.81 | 36.77 |
| Mechanical | 4,358 | 3.13 | 26.99 |
| Metallurgists/metallurgical | 391 | .28 | 26.34 |
| Safety | 590 | .42 | 35.04 |
| Other, n.e.c | 17,111 | 12.31 | (1) |
| Scientists | 1,726 | 1.22 | (1) |
| Operations and systems researchers and analysts | 154 | .11 | 50.94 |
| Statistician | 310 | .22 | 54.32 |
| All other mathematicians | 165 | .11 | 53.59 |
| Chemists | 210 | .15 | 31.35 |
| All other physical scientists | 139 | .10 | 41.73 |
| Computer specialists | 748 | .53 | 31.36 |
| Technicians | 12,713 | 9.11 | (1) |
| Computer programmer | 961 | .69 | 34.18 |
| Drafter | 1,288 | .92 | 33.23 |
| Electrical/electronic technicians | 3,464 | 2.49 | 22.42 |
| Mechanical engineering technician | 2,557 | 1.84 | 24.76 |
| Tool programmer, numerical controls | 98 | .07 | 34.12 |
| Industrial engineering technicians | 316 | .22 | 58.00 |
| All other engineering technicians | 3,578 | 2.57 | (1) |
| Physical and life science technicians | 367 | .25 | (1) |
| Mathematical technician | 84 | .06 | 34.06 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Miscellaneous transportation equipment (SIC 3790)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 2,246 | 5.50 | (1) |
| Engineers | 1,540 | 3.19 | (1) |
| Electrical/electronic | 47 | .09 | 38.65 |
| Industrial | 588 | 1.23 | 35.41 |
| Mechanical | 751 | 1.57 | 24.56 |
| Safety | 13 | .02 | 18.84 |
| Other, n.e.c. | 141 | .28 | (1) |
| Scientists | 19 | .03 | (1) |
| Operations and systems researchers and analysts | 19 | .03 | 21.63 |
| Technicians | 687 | 1.41 | (1) |
| Drafter | 530 | 1.11 | 24.05 |
| Mechanical engineering technician | 43 | .09 | 27.81 |
| Industrial engineering technicians | 33 | .06 | 21.32 |
| All other engineering technicians | 81 | .15 | (1) |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Engineering and scientific instruments (SIC 3810)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 16,017 | 21.07 | (1) |
| Engineers | 8,090 | 10.67 | (1) |
| Chemical | 141 | .18 | 34.13 |
| Electrical/electronic | 4,535 | 5.99 | 18.78 |
| Industrial | 835 | 1.10 | 18.02 |
| Mechanical | 1,271 | 1.68 | 12.13 |
| Metallurgists/metallurgical | 47 | .06 | 25.29 |
| Other, n.e.c. | 1,261 | 1.66 | (1) |
| Scientists | 830 | 1.07 | (1) |
| Operations and systems researchers and analysts | 50 | .06 | 34.21 |
| Chemists | 322 | .42 | 37.68 |
| Physicists and astronomers | 50 | .06 | 29.18 |
| All other physical scientists | 62 | .08 | 37.41 |
| Life scientists | 24 | .03 | 34.43 |
| Computer specialists | 322 | .42 | 13.43 |
| Technicians | 7,097 | 9.33 | (1) |
| Computer programmer | 557 | .73 | 12.53 |
| Drafter | 1,609 | 2.12 | 5.50 |
| Electrical/electronic technicians | 3,672 | 4.85 | 7.97 |
| Mechanical engineering technician | 360 | .47 | 17.44 |
| Tool programmer, numerical controls | 58 | .07 | 13.16 |
| Industrial engineering technicians | 140 | .18 | 18.57 |
| All other engineering technicians | 398 | .52 | 21.40 |
| Physical and life science technicians | 303 | .39 | (1) |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Measuring and controlling instruments (SIC 3820)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 43,210 | 18.46 | (1) |
| Engineers | 22,751 | 9.73 | (1) |
| Chemical | 323 | .13 | 19.88 |
| Electrical/electronic | 13,351 | 5.73 | 8.25 |
| Industrial | 2,012 | .86 | 13.52 |
| Mechanical | 2,669 | 1.14 | 8.58 |
| Metallurgists/metallurgical | 143 | .06 | 19.11 |
| Other, n.e.c. | 4,253 | 1.81 | (1) |
| Scientists | 1,993 | .83 | (1) |
| Operations and systems researchers and analysts | 194 | .08 | 31.82 |
| Chemists | 183 | .07 | 22.62 |
| All other physical scientists | 343 | .14 | (1) |
| Life scientists | 33 | .01 | 31.66 |
| Computer specialists | 1,240 | .53 | 18.54 |
| Technicians | 18,466 | 7.90 | (1) |
| Computer programmer | 1,402 | .60 | 14.96 |
| Drafter | 3,750 | 1.61 | 4.36 |
| Electrical/electronic technicians | 10,088 | 4.33 | 5.67 |
| Mechanical engineering technician | 772 | .33 | 14.40 |
| Tool programmer, numerical controls | 152 | .06 | 15.19 |
| Industrial engineering technicians | 556 | .23 | 16.53 |
| All other engineering technicians | 1,519 | .65 | 22.87 |
| Chemical technicians, except health | 170 | .07 | 26.22 |
| All other physical and life science technicians | 57 | .02 | 41.40 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Optical instruments and lenses (SIC 3830)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 7,543 | 23.17 | (1) |
| Engineers | 3,340 | 10.27 | (1) |
| Chemical | 110 | .33 | 27.77 |
| Electrical/electronic | 1,704 | 5.25 | 12.88 |
| Industrial | 373 | 1.15 | 21.81 |
| Mechanical | 570 | 1.75 | 18.55 |
| Metallurgists/metallurgical | 11 | .03 | 27.72 |
| Other, n.e.c. | 572 | 1.76 | (1) |
| Scientists | 350 | 1.05 | (1) |
| Operations and systems researchers and analysts | 15 | .04 | 18.73 |
| Chemists | 126 | .38 | 18.41 |
| All other physical scientists | 56 | .16 | (1) |
| Computer specialists | 153 | .47 | 13.96 |
| Technicians | 3,853 | 11.85 | (1) |
| Computer programmer | 266 | .82 | 21.02 |
| Drafter | 462 | 1.42 | 7.41 |
| Electrical/electronic technicians | 1,760 | 5.43 | 13.13 |
| Mechanical engineering technician | 384 | 1.18 | 12.87 |
| Tool programmer, numerical controls | 34 | .10 | 14.52 |
| Industrial engineering technicians | 36 | .11 | 28.17 |
| All other engineering technicians | 808 | 2.49 | 17.69 |
| Physical and life science technicians | 103 | .30 | (1) |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Medical and dental instruments and supplies (SIC 3840)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 13,558 | 8.09 | (1) |
| Engineers | 5,121 | 3.06 | (1) |
| Chemical | 178 | .10 | 15.45 |
| Electrical/electronic | 1,494 | .90 | 11.75 |
| Industrial | 719 | .43 | 7.59 |
| Mechanical | 1,644 | .99 | 16.09 |
| Metallurgists/metallurgical | 95 | .05 | 20.33 |
| Other, n.e.c | 991 | .59 | (1) |
| Scientists | 1,379 | .80 | (1) |
| Operations and systems researchers and analysts | 63 | .03 | 22.25 |
| Chemists | 262 | .15 | 12.62 |
| Physicists and astronomers | 4 | (1) | 43.30 |
| All other physical scientists | 37 | .02 | 30.64 |
| Life scientists | 511 | .30 | 25.82 |
| Computer specialists | 502 | .30 | 12.05 |
| Technicians | 7,058 | 4.23 | (1) |
| Computer programmer | 509 | .30 | 8.76 |
| Drafter | 1,198 | .72 | 6.55 |
| Electrical/electronic technicians | 1,410 | .85 | 11.18 |
| Mechanical engineering technician | 973 | .58 | 18.79 |
| Tool programmer, numerical controls | 35 | .02 | 33.99 |
| Industrial engineering technicians | 367 | .22 | 22.55 |
| All other engineering technicians | 1,049 | .63 | 22.72 |
| Chemical technicians, except health | 1,061 | .64 | 27.13 |
| All other physical and life science technicians | 456 | .27 | 19.68 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Opthalmic goods (SIC 3850)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 1,262 | 3.22 | (1) |
| Engineers | 468 | 1.21 | (1) |
| Chemical | 32 | .08 | 18.46 |
| Electrical/electronic | 37 | .09 | 21.67 |
| Industrial | 103 | .27 | 18.69 |
| Mechanical | 148 | .39 | 16.24 |
| Other, n.e.c | 148 | .38 | (1) |
| Scientists | 138 | .33 | (1) |
| Operations and systems researchers and analysts | 10 | .02 | 26.83 |
| Physical scientists | 70 | .17 | (1) |
| Life scientists | 9 | .02 | 44.44 |
| Computer specialists | 49 | .12 | 13.55 |
| Technicians | 656 | 1.68 | (1) |
| Computer programmer | 83 | .21 | 12.20 |
| Drafter | 74 | .19 | 13.61 |
| Electrical/electronic technicians | 52 | .13 | 28.91 |
| Mechanical engineering technician | 63 | .16 | 23.26 |
| Tool programmer, numerical controls | 9 | .02 | 32.96 |
| Industrial engineering technicians | 11 | .02 | 34.37 |
| All other engineering technicians | 191 | .50 | 27.69 |
| Physical and life science technicians | 173 | .45 | (1) |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Photographic equipment and supplies (SIC 3860)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 21,084 | 16.38 | (1) |
| Engineers | 9,753 | 7.59 | (1) |
| Chemical | 535 | .41 | 33.73 |
| Electrical/electronic | 3,616 | 2.82 | 34.79 |
| Industrial | 1,372 | 1.07 | 58.28 |
| Mechanical | 1,068 | .83 | 18.54 |
| Other, n.e.c | 3,162 | 2.46 | (1) |
| Scientists | 2,265 | 1.75 | (1) |
| Operations and systems researchers and analysts | 58 | .04 | 58.48 |
| Chemists | 847 | .66 | 23.96 |
| Physicists and astronomers | 29 | .02 | 47.06 |
| All other physical scientists | 607 | .47 | 59.88 |
| Computer specialists | 724 | .56 | 21.43 |
| Technicians | 9,066 | 7.04 | (1) |
| Computer programmer | 1,054 | .82 | 55.03 |
| Drafter | 1,365 | 1.06 | 25.70 |
| Electrical/electronic technicians | 1,886 | 1.47 | 14.38 |
| Mechanical engineering technician | 2,858 | 2.23 | 49.23 |
| Tool programmer, numerical controls | 33 | .02 | 34.84 |
| Industrial engineering technicians | 54 | .04 | 42.37 |
| All other engineering technicians | 634 | .49 | 30.47 |
| Chemical technicians, except health | 1,042 | .81 | 23.05 |
| All other physical and life science technicians | 140 | .10 | 60.75 |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Watches, clocks, and parts (SIC 3870)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 440 | 2.74 | (1) |
| Engineers | 229 | 1.38 | (1) |
| Electrical/electronic | 68 | .41 | 33.11 |
| Industrial | 69 | .42 | 14.97 |
| Other, n.e.c | 92 | .55 | (1) |
| Scientists | 21 | .12 | (1) |
| Computer specialists | 21 | .12 | 27.43 |
| Technicians | 190 | 1.14 | (1) |
| Computer programmer | 39 | .23 | 16.79 |
| Drafter | 71 | .43 | 18.15 |
| Electrical/electronic technicians | 61 | .37 | 23.08 |
| All other engineering technicians | 19 | .11 | (1) |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Jewelry, silverware, and plated ware (SIC 3910)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 574 | 1.02 | (1) |
| Engineers | 160 | .29 | (1) |
| Industrial | 93 | .17 | 10.44 |
| Mechanical | 48 | .09 | 23.10 |
| Other, n.e.c | 19 | .03 | (1) |
| Scientists | 113 | .20 | (1) |
| Physical scientists | 20 | .03 | (1) |
| Computer specialists | 93 | .17 | 11.72 |
| Technicians | 301 | .53 | (1) |
| Computer programmer | 140 | .26 | 10.47 |
| Drafter | 26 | .04 | 18.16 |
| Mechanical engineering technician | 7 | .01 | 27.84 |
| Tool programmer, numerical controls | 6 | .01 | 28.38 |
| Industrial engineering technicians | 29 | .05 | 14.21 |
| All other engineering technicians | 41 | .07 | 23.41 |
| Physical and life science technicians | 52 | .09 | (1) |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Musical instruments (SIC 3930)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 465 | 2.82 | (1) |
| Engineers | 173 | 1.04 | (1) |
| Industrial | 58 | .35 | 15.67 |
| Mechanical | 36 | .21 | 17.56 |
| Other, n.e.c | 79 | .48 | (1) |
| Scientists | 24 | .14 | (1) |
| Computer specialists | 24 | .14 | 23.57 |
| Technicians | 268 | 1.60 | (1) |
| Computer programmer | 36 | .21 | 13.40 |
| Drafter | 104 | .63 | 13.31 |
| Industrial engineering technicians | 26 | .15 | 17.20 |
| All other engineering technicians | 102 | .61 | (1) |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Toys and sporting goods (SIC 3940)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 2,342 | 2.16 | (1) |
| Engineers | 894 | .81 | (1) |
| Industrial | 289 | .26 | 8.99 |
| Mechanical | 438 | .40 | 15.86 |
| Other, n.e.c | 167 | .15 | (1) |
| Scientists | 350 | .31 | (1) |
| Chemists | 27 | .02 | 21.01 |
| Computer specialists | 323 | .29 | 19.16 |
| Technicians | 1,098 | .97 | (1) |
| Computer programmer | 237 | .21 | 10.45 |
| Drafter | 387 | .35 | 9.48 |
| Mechanical engineering technician | 100 | .09 | 22.07 |
| Industrial engineering technicians | 76 | .06 | 14.50 |
| All other engineering technicians | 227 | .20 | 21.52 |
| Physical and life science technicians | 71 | .06 | (1) |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Pens, pencils, and office and art supplies (SIC 3950)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 620 | 1.92 | (1) |
| Engineers | 201 | .60 | (1) |
| Industrial | 75 | .23 | 12.27 |
| Mechanical | 97 | .29 | 13.85 |
| Other, n.e.c. | 29 | .08 | (1) |
| Scientists | 112 | .34 | (1) |
| Chemists | 60 | .18 | 14.34 |
| Computer specialists | 52 | .16 | 11.24 |
| Technicians | 307 | .92 | (1) |
| Computer programmer | 69 | .21 | 8.76 |
| Drafter | 110 | .33 | 15.55 |
| Mechanical engineering technician | 20 | .06 | 20.85 |
| Industrial engineering technicians | 17 | .05 | 19.86 |
| All other engineering technicians | 10 | .03 | 25.29 |
| Physical and life science technicians | 81 | .24 | (1) |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Costume jewelry and notions (SIC 3960)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 469 | 1.30 | (1) |
| Engineers | 177 | .46 | (1) |
| Industrial | 72 | .19 | 14.93 |
| Mechanical | 80 | .21 | 17.77 |
| Other, n.e.c. | 25 | .06 | (1) |
| Scientists | 61 | .16 | (1) |
| Physical scientists | 19 | .05 | (1) |
| Computer specialists | 42 | .11 | 20.90 |
| Technicians | 231 | .58 | (1) |
| Computer programmer | 54 | .14 | 10.27 |
| Drafter | 85 | .22 | 17.57 |
| Industrial engineering technicians | 26 | .06 | 23.17 |
| All other engineering technicians | 40 | .10 | (1) |
| Physical and life science technicians | 26 | .06 | (1) |

See footnotes at end of table.

TABLE D-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN EACH MANUFACTURING INDUSTRY AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRY, AND THE RELATIVE ERROR: 1983--con.

Miscellaneous manufactures (SIC 3990)

| Field | Total | Percent of industry employment | Relative error |
|---|---|---|---|
| Total | 2,260 | 1.78 | (1) |
| Engineers | 621 | .49 | (1) |
| Industrial | 160 | .13 | 10.49 |
| Mechanical | 255 | .20 | 10.09 |
| Other, n.e.c | 206 | .16 | (1) |
| Scientists | 160 | .12 | (1) |
| Physical scientists | 69 | .05 | (1) |
| Computer specialists | 91 | .07 | 14.02 |
| Technicians | 1,479 | 1.17 | (1) |
| Computer programmer | 172 | .14 | 11.61 |
| Drafter | 853 | .69 | 5.94 |
| Mechanical engineering technician | 89 | .07 | 17.73 |
| Tool programmer, numerical controls | 9 | (1) | 31.62 |
| Industrial engineering technicians | 63 | .05 | 15.79 |
| All other engineering technicians | 183 | .14 | 22.14 |
| Physical and life science technicians | 110 | .08 | (1) |

(1) Relative error was not reported.
NOTE: Because of rounding, components may not add to totals.
SOURCES: Bureau of Labor Statistics and the National Science Foundation.

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## Science Resources Studies Highlights

### R&D Funds

| | NSF No. | Price |
|---|---|---|
| "9% Planned Increase in Company-funded Research and Development in 1986" | 85-329 | — |
| "15% Increase in Federal R&D Funds Proposed in 1986 Budget, Mostly for Defense Programs" | 85-322 | — |
| "Federal Emphasis on Defense a Major Factor in 1983 Increase in Industrial Performance" | 85-318 | — |
| "Federal Academic R&D Funds Continue Strong Growth Through 1985" | 85-314 | — |
| "Academic R&D Funding Increased 7% in FY 1983, Higher Gains Expected Through 1985" | 85-306 | — |
| "7% Real Growth Expected in National R&D Expenditures in 1985: Defense and Economy Major Factors" | 85-304 | — |
| "1983 Plant Biology Research Expenditures Totaled $200 Million and Were Concentrated in Land-grant Institutions" | 84-327 | — |

### S/E Personnel

| | NSF No. | Price |
|---|---|---|
| "Universities Report Research Equipment Shortages Are Most Severe in the Physical Sciences and Engineering" | 85-320 | — |
| "All fields Share in 3% Growth in Academic S/E Employment" | 85-317 | — |
| "Graduate S/E Enrollment Rose 1% in 1983, With Major Gains in Computer Science and Engineering" | 85-313 | — |
| "Shortages Increase for Engineering Personnel in Industry" | 85-309 | — |
| "Ph. D. Scientists and Engineers Shift to Industrial Employment and Related Activities" | 85-301 | — |

## Detailed Statistical Tables

### R&D Funds

| | NSF No. | Price |
|---|---|---|
| Academic Science/Engineering: R&D Funds, Fiscal Year 1983 | 85-308 | — |
| Federal Funds for Research and Development, Fiscal Years 1983, 1984, and 1985, Volume XXXIII | 84-336 | — |
| Research and Development in Industry, 1982. R&D Funds, 1982; Scientists and Engineers, January 1983 | 84-325 | — |

### S/E Personnel

| | NSF No. | Price |
|---|---|---|
| Characteristics of Recent Science/Engineering Graduates: 1984 | 85-331 | In press |
| Academic Science/Engineering: Faculty, Fall 1983 | 85-327 | In press |
| Immigrant Scientists and Engineers: 1982-84 | 85-326 | In press |
| Academic Science/Engineering: Scientists and Engineers, January 1984 | 85-316 | — |
| U.S. Scientists and Engineers: 1982, Volume 2 | 85-307 | — |
| Characteristics of Doctoral Scientists and Engineers in the United States: 1983 | 85-303 | — |
| Academic Science/Engineering: Graduate Enrollment and Support, Fall 1983 | 85-300 | — |
| The 1982 Postcensal Survey of Scientists and Engineers | 84-330 | — |
| U.S. Scientists and Engineers: 1982, Volume 1 | 84-321 | — |

## Reports

### R&D Funds

| | NSF No. | Price |
|---|---|---|
| Federal Support to Universities, Colleges, and Selected Nonprofit Institutions, Fiscal Year 1983 | 85-321 | — |
| Federal R&D Funding by Budget Function: Fiscal Years 1984-86 | 85-319 | — |
| A Comparative Analysis of Information on National Industrial R&D Expenditures | 85-311 | — |
| Federal Funds for Research and Development, Fiscal Years 1982, 1983, and 1984, Volume XXXII | 84-326 | — |

### S/E Personnel

| | NSF No. | Price |
|---|---|---|
| Participation of Foreign Citizens in the United States | 85-315 | — |
| Federal Scientific and Technical Personnel: Numbers and Characteristics, 1973 and 1983 | 85-312 | — |
| Projected Response of the Science, Engineering, and Technical Labor Market to Defense and Nondefense Needs: 1982-87 | 84-304 | — |
| Women and Minorities in Science and Engineering | 84-300 | — |

### Composite

| | NSF No. | Price |
|---|---|---|
| Science and Technology Data Book | 85-323 | In press |
| Science and Engineering Personnel: A National Overview | 85-302 | — |
| Comparison of Scientific and Technical Personnel Trends in the United States, France, West Germany, and the United Kingdom Since 1970 | 84-335 | — |
| Resources Supporting Scientific and Engineering Activities at Historically Black Colleges and Universities | 84-332 | — |
| National Patterns of Science and Technology Resources: 1984 | 84-311 | — |
| International Science and Technology Data Update | — | — |